Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Making Improvements to The Army Distributed Learning Program	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **RAND Corporation,Arroyo Center,1776 Main Street, P.O. Box 2138,Santa Monica,CA,90407-2138**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**239**	

This product is part of the RAND Corporation monograph series. RAND monographs present major research findings that address the challenges facing the public and private sectors. All RAND monographs undergo rigorous peer review to ensure high standards for research quality and objectivity.

Making Improvements to The Army Distributed Learning Program

Michael G. Shanley, James C. Crowley, Matthew W. Lewis, Susan G. Straus, Kristin J. Leuschner, John Coombs

Prepared for the United States Army

ARROYO CENTER

The research described in this report was sponsored by the United States Army under Contract No. W74V8H-06-C-0001.

Library of Congress Cataloging-in-Publication Data

Making improvements to the Army distributed learning program / Michael G. Shanley ... [et al.].
p. cm.
Includes bibliographical references.
1SBN 978-0-8330-5202-5 (pbk. : alk. paper)
1. Military education--United States—Computer-assisted instruction—Evaluation.
2. Distance education—United States--Evaluation. 3. Internet in education—United States. 4. Instructional systems—Design. I. Shanley, Michael G., 1947-.

U408.3.M34 2012
355.5—dc23

2012001164

Published 2012 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665
RAND URL: http://www.rand.org
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

Preface

Since 1998, the Army's Training and Doctrine Command (TRADOC) has been engaged in establishing and fielding The Army Distributed Learning Program (TADLP). The intent of this program is to foster and provide for the use of digital technologies to enhance and extend traditional methods of learning within the Army's institutional training strategy. Distributed learning (DL) is intended to speed the pace of learning and allow training to take place when and where soldiers need it, and the Army has an expansive vision for a greatly increased role for DL over time. For FY 2007, TRADOC asked RAND Arroyo Center to assess how efficiently and effectively TADLP had accomplished its objectives, and to provide recommendations for improvements to the program. This project continued in FY 2008 with a focus on strategic improvements to TADLP that would allow the Army to leverage DL more effectively in the future.

This document reports on Arroyo's assessment of the progress TADLP has made toward its goals, and it develops options for improving the program. The strategic examination focused on DL's role in supporting the execution of the Army Leader Development Program and the transformation of the Noncommissioned Officer Education System (NCOES).

This report will be of interest to those involved in planning, developing, delivering, and evaluating interactive multimedia instruction (IMI) and other forms of distributed learning. It will also be of interest to those involved in education and training more generally, strategic

planning for education and training, and training transformation and training system integration within the Department of Defense.

The Project Unique Identification Codes (PUICs) for the research that produced this document are ATFCR08597 and ATFCR07213.

This research was sponsored by TRADOC and conducted within RAND Arroyo Center's Manpower and Training Program. RAND Arroyo Center, part of the RAND Corporation, is a federally funded research and development center sponsored by the United States Army.

For more information on RAND Arroyo Center, contact the Director of Operations (telephone 310-393-0411, extension 6419; fax 310-451-6952; email Marcy_Agmon@rand.org), or visit Arroyo's website at http://www.rand.org/ard.html.

Contents

Figures

Tables

Summary

The Army Distributed Learning Program (TADLP), established in 1998, is part of the Army's training and leader development system and supports execution of the Army's training and leader development strategies. Distributed learning (DL) enhances and extends traditional approaches to learning by making use of multiple means and technologies to enable the delivery of training and learning wherever and whenever soldiers and leaders need it.

DL capabilities, especially the ability to provide learning "anytime, anyplace," are becoming increasingly important in supporting the Army's training and leader development system. Requirements are expanding, as is the need to export training and learning to satisfy those requirements. Training and education programs that support enhanced leader adaptability and complex thinking skills are especially needed. The training system also has to address such factors as the demands of equipment modernization, modularity, increases in the size of the Army, and the current operating environment. Thus, both the amount and the complexity of needed training have increased. Moreover, the demands of supporting major operational requirements, including Afghanistan and Iraq, have limited the Army's ability to increase the time soldiers spend in institutional schoolhouses.

The need to expand the amount of exportable learning has been further emphasized by Army Force Generation (ARFORGEN), a cyclical readiness process that places great demand on the scheduling of institutional courses and limits the length of time that soldiers can spend at a schoolhouse (away from home station). To support ARFOR-

GEN, much of institutional training must be completed in the narrow window (of about six months for the active component [AC] and one year for the reserve component [RC]) between the time a unit returns from an operational deployment and when it begins collective training. Given this context, DL has been recognized as an increasingly important part of the Army's training and leader development strategy, and the Army has identified the need to transform training and leader development programs in a major way through increased use of DL.

Despite a growing recognition of the role to be played by DL, resources for producing courseware within TADLP are limited and declining. In 2008, TADLP received only enough funding to develop a small fraction of the total institutional requirement. Further, as of January 2008, funding for TADLP for FY 2006 through FY 2011 had decreased by 40 percent from the amount budgeted three years earlier. Moreover, budget figures reveal that the production of DL courseware is receiving less emphasis over time, with a greater proportion of TADLP funds going toward the Army Learning Management System (ALMS) and DL classrooms. Considering the growing importance of DL within the Army's training, in FY 2007–2008, the Army's Training and Doctrine Command (TRADOC) asked RAND Arroyo Center to assess TADLP's performance and provide options for improvement, both in the near and longer terms. By agreement with the sponsor, the project focused on the courseware that most directly supports readiness.

Methodology and Approach

The study was done in three stages, the first two focusing on the near term, and the third focusing on the longer term. In the first stage (see Chapter Three), we used data from FY 2006 (and informal spot checks in FY 2007–2008 to ensure continued validity) to assess TADLP's program for developing interactive multimedia instruction (IMI) courseware against five measures of effectiveness for readiness-related courses: impact, efficiency, quality, cycle time, and responsiveness. In the second stage (see Chapter Four), we developed options for improving the IMI

program (as it existed up through 2008) to address the areas of weakness identified in the first stage. Finally, in the third stage (see Chapters Five through Seven), we developed and outlined options for broadening the current TADLP beyond its mainly IMI focus to increase its impact, quality, and responsiveness, and for improving efficiency.

The study drew upon a variety of methods and sources, including reviews of relevant policy and program documents; analysis of Army institutional course management data and other databases; project-developed surveys concerning specific DL courses; interviews and focus groups with proponent schools, DL contractors, and TRADOC headquarters staff; reviews of Army processes for developing courseware; and an analysis of the quality of selected IMI courseware.

Conclusions

TADLP Courseware Has Had a Narrow Focus That Limits Its Potential

The study's examination of the state of TADLP found that up through 2008 the program has had a relatively narrow focus on one approach to DL. With a small budget and limited support in TRADOC for moving away from traditional residential approaches, the program has focused primarily on producing stand-alone IMI (i.e., stand-alone computer-based instruction not needing instructor support), which focuses on the learning and comprehension of facts, concepts, and procedures in preparation for resident training.

Our Assessment Showed a Need for TADLP Improvement with Regard to All Measures of Effectiveness (MOEs)

- **Limited impact on training.** After nearly a decade of operation, DL training represents only a small fraction of the total amount of institutional training. In FY 2006, only around 100 of the 227 funded Army DL modules in the highest-priority categories (i.e., reclassification courses, Noncommissioned Officer Education System (NCOES) courses, RC Captains Career Courses, additional skill identifier/special qualifications identifier [ASI/SQI]

courses) had any enrollees, and the majority of those that were in use produced less than 200 graduates in FY 2006. Moreover, outside of ASI/SQI courses, DL accounted for less than 6 percent of all instruction in high-priority courses, with a considerably lower percentage for AC soldiers.

- **Signs of inefficiency.** The efficiency of the Army's program has been limited by a large percentage of funded courses that do not achieve enrollments or are used for only a few years after initial development is complete. The program is also limited by a relatively small number of enrollees per class, and low graduation rates.
- **Concerns about courseware quality.** We found no efforts in TADLP through FY 2008 to assess course quality at the program level. Therefore, Arroyo developed an approach to IMI evaluation that focused on technical criteria and instructional design of content. The application of this methodology to a small sample of DL courses revealed some potentially significant issues about the quality of TADLP courseware, especially with regard to the pedagogical characteristics of the instruction.
- **Long cycle times.** Through 2008, the amount of time required to produce a DL course under TADLP has been overly long. The average course production time, from the need identification to the first student use, is nearly 3.5 years. In some cases, DL courses have been declared obsolete even before they could be completed. In the commercial world, a comparable cycle time is estimated at less than a year.
- **Lack of responsiveness.** Responsiveness is the ease with which courseware can be adapted in response to changing requirements. During the period of the study, the Army used the simplest, least flexible approach in its acquisition strategy for acquiring IMI courseware. That acquisition strategy, coupled with a policy that made it difficult to update courseware on a timely basis, made DL courseware unresponsive to changing requirements.

TADLP Lacks a Structured Process for Evaluation, Assessment and Improvement

A major issue with TADLP is the lack of an overall process and supporting data for evaluation. This shortcoming severely impedes the Army's ability to identify the underlying causes of the shortfalls in TADLP performance, design effective improvement initiatives, and verify their success. Moreover, our assessment shows that such a process is feasible.

The Potential Exists to Significantly Expand the Role of DL in Army Training

Our research concluded that there is great potential for DL expansion, provided that TADLP is able to move beyond the almost exclusive focus on stand-alone IMI to deliver instruction. The program can use DL both to provide *more* training and to train *more-complex* skills. Current practices in industry, in academia, and even in some emerging Army initiatives suggest that the Army can make a much greater proportion of structured training flexible and exportable, especially for the AC.

Recommendations for Improving the IMI Program

In the course of our examination we gained an understanding of some of the key factors that underlie the areas needing improvement. We identified five near-term initiatives that would increase the impact of the Army's IMI program, increase the quality of the product, and improve the efficiency and responsiveness of the process.

Add flexibility to the courseware acquisition strategy. The Army's acquisition strategy could be made more flexible and effective by focusing on *requirements contracts*—which would "prequalify" a set of prime contractors for DL development in focused areas—and by selectively using both a systems (as opposed to product) output philosophy during acquisition planning and an incremental acquisition approach for complex IMI. Decentralizing contract management and administration could lead to further increases in responsiveness.

Ensure sufficient resources per training module for stand-alone IMI. The Army's approach to developing IMI has assumed that schools can adequately support courseware development, which was seldom the case. When such support was not available, the result was an extended cycle time and compromises in courseware quality. We recommend that the Army add more resources when needed on a per-course basis to cover such categories as subject matter expert support for development and instructor support to students during course delivery. In the short run, this would mean funding fewer DL courses, but the improved outcome will eventually lead to an increased return on investment through greater usage of DL content.

Undertake systematic process improvements to reduce IMI cycle times for production. There are a number of known issues that appear to have contributed to long development times, including too many steps and required signoffs in the production process. Although TRADOC has implemented a number of initiatives to reduce cycle time, additional improvements are possible through such actions as releasing IMI funds at the beginning of the year and continuing and refining the application of process improvement methods.

Increase local participation in IMI production and contract administration. To achieve multiple improvements in program outcomes, we recommend two ways for TADLP to increase proponent participation in IMI production. First, TADLP should increase the practice of producing some IMI in house. Proper selection of content for local production of IMI can reduce variable costs and cycle time, and it can also increase IMI's responsiveness to the need for change. Second, in cases where IMI production must still be contracted out, TADLP should decentralize selected aspects of contract management and administration in order to increase the responsiveness and the quality of the IMI product.

Institute a program-level IMI quality evaluation component to support TADLP improvements. A courseware quality assessment focusing on the instructional design and technical features of IMI courseware could be accomplished by TADLP with relatively modest resources. The results could form the basis for program-level improvements in DL. Other types of course quality evaluations should also be

added over time, such as assessing courseware currency, learner reactions, and knowledge retention.

Recommendations to Broaden TADLP to Better Support Training and Leader Development Requirements

An overall finding from our analysis is that TADLP plays an unnecessarily limited role in support of the Army's programs for training and leader development. Leveraging expanded DL capabilities (and mobile training team (MTT)) methods has the potential to create a much more exportable training capacity in support of leader development and the Reset cycle under ARFORGEN. Such changes could help to significantly reduce the length of residential courses, better support unit readiness, and reduce the backlog for NCOES courses. Below we outline three recommendations for broadening TADLP to accomplish more.

Employ Blended Learning Options to Significantly Expand DL's Role

We recommend that the Army use a broader range of DL options in addition to stand-alone IMI. A mix of approaches, such as those shown in Table S.1, can be used to extend the reach of DL. For example, key mechanisms supporting a more widespread transformation include evolution of an IMI approach that allows greater instructor support and greater use of collaborative DL to replace a large portion of resident classroom discussion hours.

Many private-sector organizations requiring DL are using a mix of approaches within a single course—resulting in a "blended learning" approach, which not only combines DL with face-to-face instruction, but also blends various types of DL. This new type of course is constructed by considering all potential modalities for delivery of training on a task-by-task basis, leading to a distribution of different modalities across an entire course.

A few courses in the Army (although outside of TADLP) are also beginning to use blended learning methods. For example, the application of blended learning options reduced the 7.5-week Special Forces

Table S.1
A Wider Range of Options for DL

Option	Description
IMI Levels 1–3, Stand-Alone	Allows students to access courses anywhere, anytime; instruction is embedded in the technology, thus requiring limited interaction or collaboration with instructors
IMI Levels 1–3, Instructor Supported	Uses technology to deliver content, but makes instructors available to monitor and support learner progress, respond to student questions, and provide feedback
IMI Level 4, Asynchronous	Uses "serious games" to provide learners with an immersive experience at high levels of interactivity
IMI Level 4, Synchronous	Involves simulations and serious games using multi-sided interactions with two or more players or multiple role players, as well as artificial intelligence and instructors
Asynchronous Collaborative DL	Uses technology to enable communication between student and instructor and among students via email, forums, discussion boards, telephones, wikis, etc.
Synchronous Collaborative DL	Involves real-time collaboration between students and instructors
Mobile Training Teams (MTTs)	Provides face-to-face instruction to learners at their locations rather than at the schoolhouse; though not technically a DL approach, this method can be used to export training

NOTE: In general, IMI levels refer to the degree the student must interact with the IMI material, with IMI Level 1 being the lowest and IMI Level 4 the highest. For a more complete definition of IMI levels, see Chapter Three.

Advanced Noncommissioned Officer Course (ANCOC) to 3.5 weeks in residence. In addition, a new version of the Basic Noncommissioned Officer Course (BNCOC) Common Core used IMI and asynchronous DL methods to create a flexible learning environment in which students can take the course anywhere and anytime over a 90-day period.

Integrate TADLP with Knowledge Management (KM)

TADLP has primarily been using DL to support learning in structured courses. But the Army has started to implement a construct in which unstructured collaborative learning and self-development also

play a large role in leader development strategies. As a second area for broadening TADLP to better support the Army's training and leader development needs, the Army should pursue opportunities to integrate TADLP with KM learning delivery programs, which involve the use of web-based support for soldier and leader learning outside the framework of formal school courses. KM learning delivery programs are included within the Center for Army Lessons Learned (CALL) and the Battle Command Knowledge System (BCKS). BCKS includes numerous forums, including some within TRADOC and others in U.S. Army Forces Command. Both CALL and BCKS provide support to leaders, staff, and soldiers with access to updated tactics, techniques, and procedures; operational insights and other lessons; and a collaborative capacity to support short-term operational knowledge needs. Soldiers can access this support in several ways, including online repositories, through Requests for Information (RFI), and community forums.

KM learning delivery programs represent a key set of DL capabilities to complement TADLP's support of structured courses. For the TADLP TRADOC Capability Manager (TCM), the biggest need is to establish a more collaborative, mutually supportive effort between the schools' instructors and training and doctrine developers on the one hand, and the CALL and BCKS programs on the other.

Enhance Key Management Functions to Achieve TADLP Transformation

This research identified important directions the Army could take both to improve the IMI-focused DL program and, more importantly, to broaden TADLP beyond IMI to better achieve its larger goals. Generating real movement in these directions will involve a significant change and require a management effort considerably larger than that needed to keep the TADLP moving along its current path. In addition to the integration of KM and TADLP described above, we have identified four additional management functions for improvement to support these directional changes. Because the TADLP TCM has the responsibility to "develop and implement policies and programs for TADLP throughout the Army training environment," the TADLP TCM should be the lead agent for improving these functions.

Institute a program-level evaluation component. Key to program management and improvement is the establishment of a means to evaluate the program to support needed improvements and timely adjustments. Our overall finding is that no systematic evaluation and assessment program is in place at the program level. Clearly, program evaluation and assessment is a critical TCM function, not only for program management but for making an effective case for resources and support. We argue that this function is one needing immediate improvement, and that an effective system could be established based on the methodology outlined earlier in this summary.

Starting with the methods piloted by Arroyo, TRADOC could begin to evaluate the impact, cost-effectiveness, quality, and responsiveness of courseware. Our assessment of impact, cost-effectiveness, and responsiveness was accomplished using available data, and so beginning the implementation would require only the development of a process for collecting and analyzing available data.

Develop concepts, plans, and directives for TADLP transformation. The TCM's office must orchestrate and support the movement of institutional training from a resident-based approach to one that is more DL-based and that includes learning outside the bounds of structured courseware. Increased coordination, integration, and collaboration across the Army will be needed to achieve the Army's DL goals. Central to a successful transformation will be evaluation and assessment of ongoing TADLP training, the development of concepts and plans for an expanded DL program, the implementation of a spiral development approach to achieve evolutionary transformation, and increased representation of the user in the acquisition of required DL support materiel (e.g., DL classrooms and learning management systems). A successful approach will also involve greater collaboration across a wide range of stakeholders, including the proponent schools and unit customers.

Implement a spiral development approach. The use of a spiral development approach will be key to implementing changes and expanding the use of DL. Spiral development is a method of rapidly implementing change while simultaneously allowing for ongoing assessment and improvement. Under this process, an initial version of

a product or program (such as a DL course) is developed as a kind of work-in-progress. This gets a working prototype fielded and piloted early, while also allowing it to be assessed, refined, and revised in stages. Once an improved version of the product or process is fielded, the process of assessment and revision continues in a new cycle.

Perform combat developer role. Combat developer responsibilities are to specify requirements for materiel systems and to represent the user community through the process of materiel development and fielding. An important TCM role is to serve as the combat developer for technology that supports TADLP execution. Because the execution of DL is heavily dependent on technological capabilities, achieving an expanded DL program is strongly related to TCM combat developer success.

An examination of the achievements of ALMS indicates that improvement of the TCM's performance in the combat developer role is needed, especially to generate improvement in utility and user friendliness. ALMS has been a major component of the TADLP for many years, and, as described earlier, an increasing portion of the TADLP budget has gone into ALMS. However, ALMS achievements have been limited, as evidenced by the small number of proponent schools that used the system.

The conclusion is that the TCM should improve its ability to define user requirements, obtain needed funding, test materiel developer products to ensure that they meet user needs, and provide continued general oversight of system effectiveness after fielding.

Implications

In this report we present options for improving the existing TADLP. We make a case for significantly expanding the use of both structured and unstructured learning to enhance the Army's leader training and development strategies. While this represents a significant shift from existing practices, we think it is needed, for DL can and should play a larger role in the transformation of training in the Army. In addition to the detailed recommendations discussed in this report, top-down

command emphasis, willingness to change, and oversight will all be key to achieving this transformation.

Acknowledgments

This study benefited from the assistance of many people in the Army and affiliated organizations. We are particularly indebted to COL James Markley, COL Robert Morris, and other members of the TRADOC staff, including Mr. Bruce P. Schoch, LTC Frank H. Anderson, LTC Mark R. Lynch, Mr. D.E. "Mac" MacAllister, Mr. Jeffrey Coliman, Mr. Danny Hubbard, and Ms. Vallery L. Doe; and to the DL staff at the Army Training Support Center (ATSC), including Dr. Connie S. Wardell, Mr. James Tripp, Mr. Joseph Delizzio, and the ATSC staff of courseware managers and contractor officer representatives. Special thanks are given to Mr. Robin Stewart for his efforts to help project team members document the DL development process. Mr. Vincent D. Young of the Training Operations Management Activity (TOMA) also provided valuable information on DL usage.

Our understanding of the Army Learning Management System (ALMS) and Digital Training Facilities was greatly increased via support from LTC Robert A. Bean, Product Manager for the Distributed Learning System, and his staff. Special recognition goes to Mr. Steve Eldred for his thoughtful comments on our project and willingness to provide information to the team.

Similarly, we would like to express our appreciation to Colonel Jim Galvin and Dr. Rick Morris, as well as the entire CAC-K staff at Fort Leavenworth, who provided valuable assistance to our examination of the Army's Knowledge Management programs.

We would also like to extend our sincere thanks to those from Army proponent schools and commercial contractor organizations

developing Army courseware. Many members of those organizations participated in extended interviews and telephone surveys concerning their DL development experience. Their willingness to speak frankly made possible important components of our analyses. We also extend special thanks to those at proponent schools who hosted our team members during site visits and helped us design our survey instruments. Their willingness to share their experiences and insights was very important to completing our analyses and producing viable recommendations.

We also received valuable input and support from Ms. Gail Hammond and Ms. Victoria Calhoun with Department of the Army (DA), G-3/5/7.

This work also benefited significantly from the input of a number of RAND colleagues, including Chip Leonard, Frank Camm, Anisah Waite, Rachel Burns, Lynn Scott, Andrew Parker, Artur Usanov, Rodger Madison, Danielle Varda, Steven Cram, and Lindsay Daugherty.

List of Acronyms

AAR	After-Action Review
AC	Active Component
ACP	Army Campaign Plan
ADL	Advanced Distributed Learning
AIT	Advanced Individual Training
AKM	Army Knowledge Management
AKO	Army Knowledge Online
ALARACT	All Army Activities
ALC	Advanced Leader Course
ALMS	The Army Learning Management System
AMC	Army Materiel Command
AMEDD	Army Medical Department
ANCOC	Advanced Noncommissioned Officer Course
ARFORGEN	Army Force Generation
ARI	Army Research Institute
ARNG	Army National Guard
ASAT	Automated Systems Approach to Training
ASI	Additional Skill Identifier
ATLDS	Army Training and Leader Development Strategy
ATSC	Army Training Support Center

ATRRS	Army Training Requirements and Resources System
BCC	Brigade Coordination Cell
BCKS	Battle Command Knowledge System
BNCOC	Basic Noncommissioned Officer Course
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CAC	Combined Arms Center
CAC-K	Combined Arms Center–Knowledge
CAD	Course Administrative Data
CALL	Center for Army Lessons Learned
CCC	Captains Career Course
CCT	Courseware Certification Team
CLIN	Contract Line Item Number
CONUS	Continental United States
COR	Contracting Officer's Representative
COTS	Commercial Off-the-Shelf
CPX	Command Post Exercise
CSA	Chief of Staff of the Army
CTC	Combat Training Center
DA	Department of the Army
DAU	Defense Acquisition University
DDTC	Deployed Digital Training Campus
DL	Distributed Learning
DLETP	Distributed Learning Education and Training Products
DLKN	DL Knowledge Network
DLS	Distributed Learning System
DL XXI	Distributed Learning Twenty-One

DO	Delivery Order
DoD	Department of Defense
DOIM	Directorate of Information Management
DOT	Director of Training
DTF	Digital Training Facilities
DTTP	Doctrine, Tactics, Techniques, and Procedures
ELO	Enabling Learning Objective
EMD	Engineering and Manufacturing Development
FAR	Federal Acquisitions Regulation
FM	Field Manual
FORSCOM	Forces Command
FTX	Field Training Exercise
GFI	Government Furnished Information
GFM	Government Furnished Material
GSD	Guided Self Development
HQDA	Headquarters, Department of the Army
IBM	International Business Machines
IMDP	Instructional Media Design Package
IMI	Interactive Multimedia Instruction
IT	Information Technology
ITR	Individual Training Record
KM	Knowledge Management
KO	Contracting Officer
LMS	Learning Management System
MACOM	Major Commands
MDEP	Management Decision Evaluation Package
MOS	Military Occupational Specialty
MTT	Mobile Training Team
NCO	Noncommissioned Officer
NCOES	NCO Education System

NRCC	Northern Region Contracting Center
OCONUS	Outside the Continental United States
OES	Officer Education System
OIL	Observations, Insights, and Lessons
ORD	Operational Requirements Document
PB	President's Budget
PCO	Procuring Contract Office
PEG	Program Evaluation Group
PEO EIS	U.S. Army Program Executive Office Enterprise Information Systems
PM	Program Manager
PM DLS	Program Manager for Distributed Learning Systems
PME	Professional Military Education
POI	Program of Instruction
RC	Reserve Component(s)
RDL	Reimer Digital Library
RFI	Request for Information
RFP	Request for Proposal
ROI	Return on Investment
SAT	Systems Approach to Training
SCORM	Sharable Content Object Reference Model
SF	Special Forces
SLC	Senior Leader Course
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SQI	Special Qualifications Identifier
SSD	Structured Self Development
TADLP	The Army Distributed Learning Program
TCM	TRADOC Capability Manager

TCP	TRADOC Campaign Plan
TDADD	Training Development and Delivery Directorate
TDY	Temporary Duty
TEA	Training Effectiveness Assessment
TLO	Terminal Learning Objective
TOE	Table of Organization and Equipment
TOMA	Training Operations Management Activity
TQM	Total Quality Management
TRADOC	Training and Doctrine Command
TSP	Training Support Package
TTP	Tactics, Techniques, and Procedures
VTC	Video Teleconference
VTT	Video Teletraining
WfF	Warfighters' Forums
WKB	Warrior Knowledge Base

CHAPTER ONE

Introduction

Distributed Learning Is Becoming an Increasingly Important Part of the Army's Training Strategy

The Army Distributed Learning Program (TADLP) is part of the Army's training system and supports execution of the Army's training and leader development strategies. The overall goal of these strategies is to prepare soldiers, leaders, civilians, and organizations to conduct a wide range of operational missions. Leader development strategies have the additional goal of providing for the long-term development of Army leaders.[1] Distributed learning (DL) enhances and extends traditional methods of learning by making use of multiple means and technologies to enable the delivery of training and learning wherever and whenever soldiers and leaders need it. With the advancement of digital technologies, the Army envisions an increasingly important role for DL in all three domains of Army soldier and leader training and development: institutional (structured courses emanating from Army training institutions), operational (individual and collective training conducted in the operating force), and self-development (additional schooling or study outside the institutional and operational domains).[2]

[1] For a description of Army training and leader development strategies and systems, see HQDA, Army Regulation (AR) 350-1, *Army Training and Leader Development*, August 2007, and HQDA, Army Field Manual (FM) 7-0, *Training for Full Spectrum Operations*, December 2008.

[2] FM 7-0, Chapter 3.

The demand for DL (i.e., the need to be able to train at any time and any place) has increased since deployments began in 2002. Posing the largest training challenge to the Army is the need to prepare units and leaders for a greater range of possible operational missions, or full-spectrum operations, while at the same time supporting a demanding set of ongoing operations. The reserve components (RC) have come to be employed as an operational force rather than just a strategic reserve, thus increasing the importance of a training and leader development system that responsively meets the current needs of all components. The requirement for a full-spectrum capability has expanded the number of tasks that soldiers and leaders will be asked to perform, by emphasizing stability as well as traditional combat tasks. A full-spectrum capability also requires leaders who understand a wide range of operational concepts and can apply them across greatly varying conditions.

These challenges are amplified because the training system also has to cope with the demands placed on it by equipment modernization, modularity, and increases in the size of the Army. The Army is phasing in a range of new equipment, including advanced capabilities in Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). Fully leveraging these technologies requires training in complex analysis, planning real-time decisionmaking, and rapid adaptation. Modular equipment concepts generally emphasize leveraging C4ISR systems and thus create a greater need to train leaders on complex synchronization skills.[3]

The trends above give rise to changes and increases in the tasks, skills, and knowledge the Army needs to train in its soldiers and leaders.[4] Some areas, such as the conduct of stability and counterinsurgency operations, are now considered much more important than they were in the past. Moreover, the tactics and techniques that underpin training change as operational requirements and conditions change. Thus, the training system, including DL courseware, must be highly respon-

[3] TRADOC, *Army Comprehensive Guide to Modularity*, October 2004.

[4] ARI, *Training for Future Operations—Digital Leaders' Transformation Insights,* ARI Special Report No. 53, November 2002.

sive so that it can maintain currency, increase total learning delivery capability, and meet the sometimes differing needs of all components.

The current operating environment and the ongoing high demand for deployed units have led the Army to adopt Army Force Generation (ARFORGEN), a cyclical readiness process that requires active Army units to move progressively through a structured set of collective training exercises over a three-year cycle and the RC to go through a five- to six-year cycle.[5] This cycle requires the basic individual skills and tasks necessary for collective execution to be trained and institutional courses to be conducted during a fairly narrow window of time at the beginning of the cycle, just after a unit may well be returning from a deployment. Training and leader development strategies must adapt to focus on supporting unit readiness in the context of this cycle. Thus, the requirement places great demand on the scheduling of institutional courses and limits the length of time soldiers have to spend at a schoolhouse (away from home station).

At the same time that demands on the training system are increasing, the overall trend has been to reduce the amount of training conducted and required at the schoolhouse.[6] To provide the training eliminated by these reductions and cover the new required skills and tasks, the Army has aimed to leverage DL methods and the potential of the self-development domain.

Plans to employ DL are documented in multiple Army publications. The Army Campaign Plan (ACP), which directs planning, preparation, and execution of Army transformation, has "Train the Army and grow adaptive leaders" as one of its seven major goals and identifies DL as a key means of supporting its achievement.[7] Further, the ACP outlines a major role for DL in supporting a life-long learn-

---

[5] For more details, see Annex F (ARFORGEN Implementation Plan) and Annex G (Lifecycle Management) in HQDA, *Army Campaign Plan–Change 5,* April 2007.

[6] Initial Military Training courses are the exception, where enlisted and officer courses have lengthened by about a week to increase combat skills training (Warrior tasks).

[7] *Army Campaign Plan–Change 5,* April 2007. Annex L outlines the specifics of Army training and leader development transformation plans and requirements. The ACP is continuously being revised, but a newer draft version we examined retains the objective of growing adaptive leaders and outlines DL as a key means of supporting its achievement.

ing construct. Under this construct, the Army's institutional doctrine and leader development capability will transform to create "classrooms without walls," allowing access to knowledge and expertise from units' home stations and deployed locations. Supporting this concept are a number of initiatives in the TRADOC Campaign Plan (TCP), including the goal of establishing an exportable training capability for the Noncommissioned Officer Education System (NCOES).[8]

Although the effort to transform training and leader development programs is just beginning,[9] some revisions are already under way. A leading effort in this regard has been to transform NCOES, and a major role for DL is envisioned. The current direction is to place most common core instruction into required DL modules, called Structured Self-Development (SSD).[10] Each SSD module is envisioned as being 80 hours in length. SSD1 will precede the Warrior Leader Course, SSD2 the Advanced Leader Course (ALC), SSD3 the Senior Leader Course (SLC), and SSD4 the Sergeants Major Course. SSD5 will be after the Sergeants Major Course. As a part of the NCOES transformation plan,

---

[8] U.S. Army Training and Doctrine Command, *TRADOC Campaign Plan with Change 1*, June 2006.

[9] The Army has developed a draft "Army Training and Leader Development Strategy" (ATLDS), which outlines broad goals and objectives but has not yet been refined to outline a specific concept or plan on how these are to be achieved. See HQDA, *Army Training and Leader Development Strategy,* draft, March 2008.

[10] We have reviewed numerous briefings on NCOES transformation and have discussed this program in visits with staff members at TRADOC Headquarters, the U.S. Army Sergeants Major Academy, and the U.S. Army Armor School. Under NCOES transformation, the names and objectives of the NCOES courses for E6s and E7s changed in October 2009. The course for E6s previously titled the "Basic NCO Course" (BNCOC) had the objective of teaching E6-level tasks and skills. That course is now the ALC; under the transformed NCOES program, the goal is still to have NCOs attend the ALC prior to promotion to E6, but they will learn E6- and some E7-level tasks and skills. The course for E7s was previously titled the "Advanced NCO Course" (ANCOC) and taught E7 tasks and skills. That course is now the SLC; under the transformed NCOES program, the goal is still that NCOs will attend SLC prior to promotion to E7, but they will learn E7 and some First Sergeant tasks and skills. It should be noted that current promotion policies allow for promotion to E6 without ALC and to E7 without SLC, but these policies do not align with NCOES transformation goals, nor with the design of NCOES courses. For the remainder of the report, we will use the current course titles except when specifically discussing NCOES courses prior to 2009.

DL will also be used to provide Guided Self-Development (GSD), comprised of a set of recommended but optional learning modules. A key purpose of SSD, and to some extent GSD, is to allow for a combination of expanded NCOES content and reduced resident course length.

TADLP Resources Are Declining

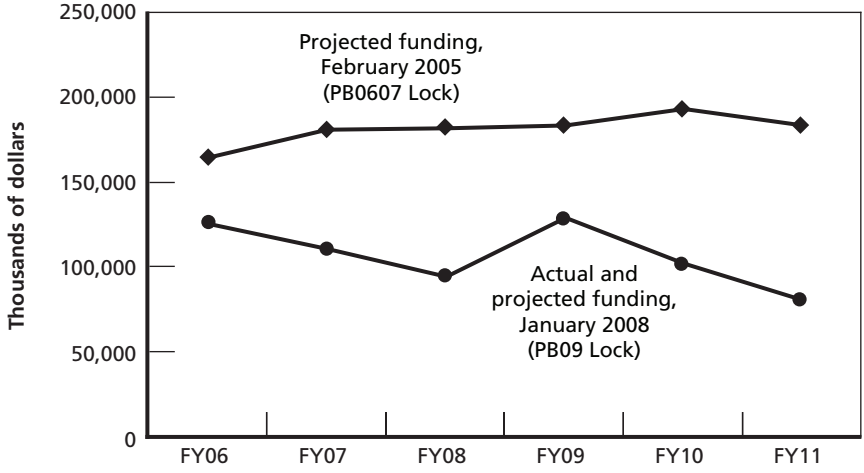
Although the need for DL appears to be increasing, resources for TADLP declined sharply in the years leading up to this assessment. In the President's Budget released in February 2005, the Army projected it would spend over $1 billion on TADLP from FY 2006 through FY 2011, an amount that represented a gradual increase in the program's overall funding level over the period and over the levels seen in the first half of the decade (see Figure 1.1). However, three years later, in January 2008, the Army was funding the program at a level that was 40 percent less than that earlier amount over those same years.[11] Figure 1.1 shows that actual funding for FY 2006 and FY 2007 was more than 30 percent lower than the former projections and that investments from that point onward would go down even further. Moreover, an even smaller proportion of the total dollar amounts is budgeted to go to U.S. Army Training and Doctrine Command (TRADOC) relative to other commands, indicating that funding for TRADOC is decreasing faster than the funding for those other commands.

Budget figures also reveal that the production of DL content is being de-emphasized within TADLP. The main components of TADLP are (a) courseware development, (b) the Army Learning Management System (ALMS), and (c) DL classrooms, both fixed and deployable.[12] The production of courseware should be the centerpiece of the program; the other two elements are supporting components. However,

[11] Derived from a comparison of the President's Budget (PB) 0607 lock (released on February 16, 2005), with PB09 lock (released on January 28, 2008) in the PROBE database, where the Army stores budget-related data.

[12] There are a number of lesser components of TADLP not covered in this report, including the Army e-Learning program, which delivers off-the-shelf commercial DL courseware to provide information technology, foreign language, and other types of workforce training.

Figure 1.1
Army Resources Dedicated to TADLP (FY 2006–2011)



RAND *MG1016-1.1*

we found that courseware constituted a relatively small and decreasing component of TADLP funding. For example, over FY 2003 through FY 2009, courseware funding was 32 percent of total program funding, and that share was projected to go down to an average of only 23 percent over FY 2010 through 2013.[13]

Purposes of This Study

Considering the growing importance of DL within the Army's training as well as the increasingly constrained resources available for DL, TRADOC asked RAND Arroyo Center to assess the performance of TADLP in the FY 2007–2008 time frame. A key purpose of this assessment was to document the state of TADLP at that time in order to establish a baseline against which future improvements to the pro-

[13] Derived from PB09 lock (released on January 28, 2008), plus final funding figures for the years before FY 2006.

gram could be measured.[14] In addition, the project sought to propose options that the Army could implement to improve DL performance. This second objective had two major purposes. The first year of the project focused on improvements to TRADOC's program for developing computer-based interactive multimedia instruction (IMI).[15] The second year of the project focused on the potential for making strategic improvements to TADLP so that the Army can leverage DL more effectively in the future. The three key purposes of the study are displayed in Figure 1.2.

Approach

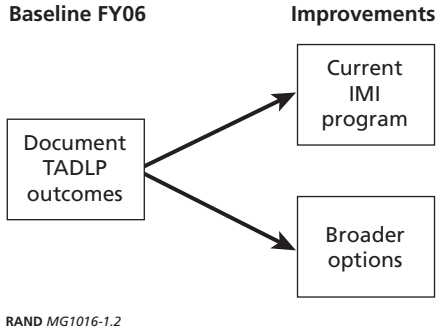
The study was done in three stages, one for each of the key purposes as shown in Figure 1.2. In the first stage, we used data from FY 2006 to assess TADLP courseware against five measures of effectiveness: impact on training, efficiency of process, quality of content, cycle time of production, and responsiveness to the need for change. In the second stage, we developed options for improving the IMI program (as it existed up through 2008) to address the areas of weakness identified in the first stage. Finally, in the third stage, we developed and outlined broader options for increasing the program's impact and improving cost-effectiveness over the longer term.

---

[14] The report does not cover enhancements or changes to TADLP after the assessment period. However, in the case of the knowledge management (KM) program, a more recent assessment has allowed us to update our comments to the end of FY 2010. See Chapter Six.

[15] As per TRADOC Regulation 350-70, IMI is a term applied to a group of predominantly interactive, electronically delivered training and training support products. IMI can link a combination of media, to include but not be limited to programmed instruction, video tapes, slides, film, television, text, graphics, digital audio, animation, and up-to-full motion video, to enhance the learning process. IMI products include instructional software and software management tools used in support of instructional programs. IMI products are teaching and management tools and may be used in combination or individually. Used individually, not all IMI products can be considered interactive, multimedia, or instructional. However, IMI products, when used in combination with one another, are interactive, multimedia, and instructional.

Figure 1.2
Conceptual Design of Project



We focused the majority of our analysis on issues related to DL courseware. This decision was supported by early findings confirming that only a small amount of high-priority courseware was active in FY 2006. Clearly the "long pole in the tent" for the program, the production of more content would be needed before the other two parts of TADLP (learning management infrastructure and facilities) would be relevant to the Army's key requirements for DL.

We further focused our efforts within the area of courseware on Army training most directly connected to readiness (and also the longest and most demanding training), the Army's "priority one" courses. These included military occupational specialty (MOS) transformation courses supporting reserve component duty MOS qualification needs, key Professional Military Education courses—the Basic and Advanced Noncommissioned Officer Courses (BNCOCs and ANCOCs) and Captains Career Courses[16]—and the most important functional courses: those important enough to units to be designated as additional skill identifiers or special qualifications identifiers.

To conduct our DL impact analyses (stage one), we used databases maintained by Army G-1 (the Army Training Requirements and

[16] We found only a smattering of Officer Education System (OES) courses that used DL below the Captain level. While some OES courses for the Major level and above use distributed means, they are not funded through TADLP and thus are excluded from this report.

Resources System, or ATRRS), Army Training Support Center (various data on proposed and funded courses), and the Training Operations Management Activity (DL course graduates over time). To identify the characteristics of active DL courses, we also surveyed and interviewed representatives from Army proponent schools, contractors and headquarters staff from Army Training Support Center (ATSC) and TRADOC, and various other DL experts inside and outside the Army and the military.

As part of this effort, a survey of seven questions was sent to TRADOC proponent schools with active DL courses. The survey focused on each piece of courseware that fell into the project's area of focus (those courses tied most directly to readiness).[17] The questions can be found in Appendix A.

The first stage also included a quality review of selected IMI courseware. We designed and conducted a limited qualitative evaluation of a stratified sample of the instructional design of 10 TADLP courses developed between 2005 and 2007 (focusing on nearly 80 lessons and 190 hours of instruction). Criteria for the evaluation encompassed detailed technical, production-quality, and pedagogical elements of the courses.

We employed a number of other approaches to gain insights on how TADLP could be improved (stages two and three). We drew upon various data sources for this part of the analysis:

- Focus groups with three different stakeholder groups attending TRADOC's annual DL conference in March 2007: (a) TADLP contractors for custom content development; (b) ATSC courseware managers and contracting officer's representatives (CORs); and (c) Army proponent school representatives attending the conference.
- A comparative review of courseware production processes and practices within TRADOC and within the commercial sector.

[17] A currently active course was defined as one which, according to ATRRS, had enrollments in FY 2006 or (through the first half of) FY 2007, or which had requirements in FY 2007 or FY 2008.

This included interviews with staff at ATSC as well as production managers at a number of commercial training organizations, and experts from DL industry groups.

- Structured interviews with TRADOC proponent schools. We conducted extended telephone interviews with personnel associated with 20 Army DL programs that applied for and received TADLP funding in the past. Participants typically included contracting representatives, course managers, team leads, training division or branch chiefs responsible for the production of DL, and in some cases the school's director of training. Topics addressed during the interview included the role of DL in the school's larger training strategy, how the schools selected training content to be converted to DL, the amount of resources dedicated to the DL program at the school, school efforts to assess the DL products they produced, and obstacles and suggested improvements related to the implementation of TADLP.

Organization of This Report

The remainder of this report is divided into seven chapters.

- Chapter Two provides an overview of TADLP.
- Chapter Three provides the results of the first stage of the analysis, an assessment of the status of Army DL as of FY 2006 with regard to courseware impact, efficiency, quality, cycle time, and responsiveness.
- Chapter Four provides the results of the second stage of the analysis, which identifies potential improvements to the Army's IMI program that can positively influence TADLP outcomes with regard to the measures of effectiveness presented in Chapter Three.
- Chapter Five is the first of three chapters dealing with the results of the third stage of the analysis, which focuses on broader changes the Army might make in its approach to DL.
- Chapter Six presents the next set of third stage results by examining the Army's use of knowledge management (KM) methods

to deliver learning, assessing the benefits thereof, and considering how KM learning delivery might be integrated into DL.
- Chapter Seven discusses the management functions that are key to improving and broadening TADLP, and suggests directions for their improvement.
- Chapter Eight summarizes the major conclusions, recommendations, and implications of this study.

The report also contains two appendixes. Appendix A describes the survey and interview methods used and provides the two questionnaires, one used to determine the specific characteristics of DL courses, and another used to guide semi-structured interviews with proponent schools. Appendix B discusses in greater detail the results of interviews with training development personnel from 20 Army schools and programs; results from these interviews were used as one input for recommended improvements presented in Chapter Four.

CHAPTER TWO

Features of The Army Distributed Learning Program (TADLP)

In this chapter we provide an overview of TADLP as it existed in the FY 2006–2008 time frame. While many organizations in the Army develop and deliver DL,[1] TADLP is the only formal program in the Army dedicated to DL. A basic understanding of the program forms the context for our assessment and recommendations.

There are four sections in this chapter. First, we review the funding, organization, and main components of TADLP. Second, we examine the Army Learning Management System (ALMS), which TRADOC has developed to manage DL and support resident instruction. Third, we briefly describe the network of worldwide facilities supported by the DL program. Finally, and consistent with our emphasis on IMI in this report, we provide a description of the process for IMI production. The discussion is included as a "feature" of TADLP because it will provide important background for a number of our subsequent recommendations.

[1] For example, much IMI is produced by program managers (PMs) in the Army to support training in connection with the fielding of materiel systems. Army schools and commands also sometimes purchase their own infrastructure and individually produce their own courseware either by themselves or in partnership with commercial or academic partners.

TADLP Overview

Program Components and Budgets

With an overall budget in FY 2006 of about $125 million per year, TADLP is funded by the Training PEG (Program Evaluation Group) and pursues an expansive set of DL and related objectives for Army training.[2] The main components of TADLP support Army-unique training with courseware development, the ALMS, and DL classrooms, both fixed and deployable.[3] Three Army organizations receive the majority of TADLP funds: TRADOC, Army National Guard (ARNG), and the Program Manager for Distributed Learning Systems (PM DLS).[4] PM DLS receives about half of all funds.

In FY 2006, funding for TADLP was allocated approximately as follows: 25 percent for courseware, 25 percent for learning management systems, and the remaining 50 percent for facilities (e.g., digital training centers). TRADOC and ARNG receive the courseware funds, PM DLS receives the funds for learning management systems, and all three organizations receive the funds for facilities. While the largest component of funding goes toward facilities, the numbers are somewhat misleading from a DL perspective because those facilities provide for a wide range of uses related to digital communication, and thus serve to provide much more than "support of DL."

As briefly discussed in the last chapter, budget trends show a decreasing emphasis on TADLP. After generally increasing through the middle of FY 2005, budgeted funding for TADLP decreased in FY 2006 and for the future. Further, the downward turn has been sharper

---

[2] In the application of distributed learning methods, TADLP supports the "DoD intent to deliver 'learner centric' quality training when and where required, increasing and sustaining readiness throughout the force, Active and Reserve."

[3] As previously noted, there are a number of lesser components of TADLP not covered in this report, including the Army e-Learning program.

[4] DLS is part of the U.S. Army Program Executive Office Enterprise Information Systems (PEO EIS). PEO EIS is responsible for project management of DoD and Army business and combat service support systems, as well as related Army communication and computer infrastructure. Although most PMs are funded out of the equipping PEG, DLS is funded out of training, given its importance there.

in recent years. For example, as of February 2005 the Army expected to spend more than $1 billion dollars on TADLP from FY 2006 through FY 2011. But three years later, in January 2008, the Army had provided 40 percent less funding than previously planned over those years.[5]

In addition, a smaller proportion of funds is going to TRADOC relative to the proportion going to the other major DL claimants. PM DLS appears to be receiving a relatively steady steam of funds, but TRADOC and the ARNG experienced a significant decrease. Moreover, TRADOC funds are declining at a greater rate than ARNG funds.

Budget trends also show that, in the future, TADLP expenditures for courseware are expected to account for a decreasing percentage of total funding. For example, in FY 2003–2009, courseware accounted for an average of 32 percent of total TADLP funding. In contrast, in FY 2010–2013, courseware funding amounts to only 23 percent of total TADLP funding, a reduction of approximately one-third. Moreover, funding for courseware is increasingly going to the ARNG rather than TRADOC. Prior to FY 2006, nearly all courseware funding went to TRADOC, but in FY 2006–2011, 40 percent of the funds are allocated to the ARNG, with that percentage increasing in the later years. This trend reflects, in part, increasing specialization in courseware development, as the ARNG focuses more on RC needs and the reclassification mission, and TRADOC specializes in active component (AC) needs and NCOES. The trend may also reflect a Department of the Army (DA) perception of a more efficient ARNG process for developing DL courseware.

TADLP also depends critically on support resources from TRADOC and the Installation Management Command. These resources, which are not tracked or attributed to DL, include both manpower (e.g., training development expertise, subject matter experts to support contractors, and program management resources) and dollars (e.g., to purchase installation and information services).

---

[5] Derived from a comparison of PB0607 lock (released on February 16, 2005), with PB09 lock (released on January 28, 2008) in the PROBE database.

Players and Roles

TADLP is managed overall by DA's G-3/5/7.[6] Design and implementation responsibilities have been given to the TRADOC Capability Manager (TCM), the head of the Distributed Learning Directorate within TRADOC's G-3/5/7. The TCM has the TRADOC staff responsibility to "develop and implement policies, plans, and programs for TADLP throughout the Army training environment."[7]

One of the key roles of the TCM is as the "combat developer" for DL. The primary duties of the combat developer are to specify requirements for materiel systems and to represent the user community through the materiel development process. In the case of DL, materiel systems would include learning management systems (LMSs) and DL facilities. PM DLS is the materiel developer for DL. The materiel developer is responsible for the acquisition and management of materiel systems (i.e., LMSs and facilities) that meet the requirements specified by the combat developer.[8]

The TCM for TADLP has also recently had its DL development responsibilities expanded to include the establishment of an Army-wide process for DL governance. This role includes establishing oversight over the development, management, registration, and delivery of DL courseware not only within TADLP but throughout the Army.[9]

The Army Training Support Center (ATSC) is a field operating activity under TRADOC that provides management support in the execution of courseware development contracts and in courseware testing, and in the development of DL technical standards and specifications. Schools and other training organizations are responsible for designing, developing, and delivering DL to the ultimate customers, who are Army soldiers, leaders, and unit commanders.

---

[6] Other staff elements of DA are also involved, especially the G-1, which has primary responsibility for personnel readiness.

[7] TRADOC Regulation 10-5-1.

[8] The integration of the roles of the combat developer and materiel developer is complex; it is governed by statute as well as policy and regulation. See AR 70-1, *Army Acquisition Policy,* December 2003, and AR 71-9, *Materiel Requirements.*

[9] DA message on "All Army Activities" (ALARACT), May 6, 2007.

Courseware

We now discuss DL courseware produced under TADLP. DL courseware is defined broadly by the Army as including all instructional media using a technology interface. DL courseware includes IMI, correspondence courses (if delivered digitally), simulation and gaming when used within instructional media, and video teletraining (VTT) and other forms of collaborative training.[10]

Courseware Development Goals

The goal for TADLP, established at the program's inception in 1996, has been to produce 525 completed DL courses by 2010. From its inception through mid-FY 2006, over 400 DL courses had been funded for development under TRADOC. Scores of Army proponent schools, commands, and other agencies have successfully participated in DL courseware development. The organizations with the most courseware completions (or expected completions) are the following centers and schools: Army Medical Department (AMEDD), JFK Special Warfare, Ordnance, Military Intelligence, Transportation, Engineer, Quartermaster, Field Artillery, Signal, Chemical, and Armor. These 11 account for 70 percent of the completions.

Courseware Prioritization

The choice of which DL courses to fund is determined by a prioritization process in which schools (and other commands and agencies) propose content to be converted, and TRADOC determines priorities for funding. Prioritization within training is based on a number of considerations, including the following:

- Mission criticality and emerging Army training priorities (e.g., as reflected in commanding general or proponent school priorities).
- Suitability of content for DL delivery, including the likelihood of content to change.

[10] Among the exclusions to this broad definition of "DL courseware" specifically cited by the Army are simulators embedded in actual or virtual equipment.

- Return on investment (ROI) considerations (e.g., student load, number of hours).
- Performance of school in past development processes (i.e., fielding rate, submission of documentation).
- Equitable distribution of DL among schools.

DL Courses Active During FY 2006

To help ourselves understand the nature of the Army's program, we looked more closely into active DL courses that had the highest Army priority. In line with our focus on FY 2006 as a base year, we defined courses to be "active" if ATRRS showed enrollments during FY 2006. The course categories of highest priority included MOS reclassification courses and selected Professional Military Education courses supported by TADLP, including Basic NCO courses (BNCOCs), Advanced NCO courses (ANCOCs), Captains Career Courses (CCCs) for RC soldiers, and key functional courses designed as "additional skill identifiers" (ASIs) or "special qualifications identifiers" (SQIs).[11] Those courses accounted for 60 percent of all TADLP-funded courses through FY 2006. We identified 103 active DL courses in FY 2006 out of 227 funded. The most prevalent were reclassification courses, and the least prevalent were ANCOC courses.

DL Course Characteristics

For each active course, we asked the proponent to identify the course characteristics and to describe how it was used in practice. Below we describe the salient features of high-priority DL courses in FY 2006.

Asynchronous IMI was the main DL modality. Although DL is defined broadly in regulations as including many forms of instructional media, the active, high-priority courses used almost exclusively asynchronous IMI, that is, DL in which the learning content is delivered by the software without the need of an instructor, thereby provid-

[11] While the NCOES courses after October 2009 are named ALC and SLC, in this chapter we are referring to courses taught in 2006–2008, and we will use BNCOC and ANCOC, their names during that period.

ing the student with the flexibility to access instruction at any time. A few courses used VTT, a form of collaborative media, including two courses (Battle Staff Course and BNCOC Common Core) that generate some of the highest enrollments in the program, especially for AC soldiers.

DL was typically used as the initial segment of a phased learning model. Most Army DL courses are not courses at all, but modules that support a phased learning strategy for a larger course. Most often the DL phase served as cognitive preparation for the longer residential portion of the course.[12] Moreover, most of that preparation was aimed at the "knowledge," and "comprehension" levels of learning in Bloom's taxonomy of learning.[13] The "application" and higher levels of learning needed for true competence in leader tasks were almost exclusively left to the residential portion of the course, even though DL has some capabilities in those areas.[14]

Army DL was primarily self-paced learning, with little student-instructor interaction. Although the Army definition of DL allows for both synchronous and asynchronous interaction between student and instructor, most Army IMI in FY 2006 was self-paced, with most interaction taking place between student and media.[15] In our survey of active DL courses, we found that 78 percent were described as having "very low" student-instructor interaction, and another 10 percent as having "low" interaction. At a minimum, students would have the Army Help Desk as a number to call for support, which could forward substantive questions to proponent schools for a response. In addition, in at least one case, the proponent school reported receiving some calls

---

[12] In some cases, the DL phases also cover common core material that is not taught in residence phases.

[13] Ninety-two percent of the DL modules were tested course requirements, with the remainder used as self-study or homework.

[14] For further explanation, see http://www.nwlink.com/~donclark/hrd/bloom.html. The levels of learning in Bloom's cognitive domain, in order of increasing complexity of the learning goal, are knowledge (being able to recall information from memory), comprehension, application, analysis, synthesis, and evaluation.

[15] Varying levels of interactivity between learner and media are defined in Chapter Three.

directly from learners of DL courses, although it did not have anyone dedicated to the task of student support.

DL course phases were relatively long for self-paced IMI. Most DL modules required weeks of effort for learners to complete. Course modules varied from 12 to 420 academic hours in length, with the average being about 60 hours for all types of high-priority courses except CCC, which averaged about twice that length.

DL course modules focused most on RC readiness. The list of DL courses active in FY 2006 showed TADLP's emphasis on RC readiness. Both the MOS reclassification and CCC course modules, accounting for over half of the total, had almost exclusively an RC learner base. Overall, schools reported that AC students had some level of participation in only 35 percent of the active DL courses. AC students were almost never the primary enrollees; however, BNCOC and ASI/SQI course modules often had a mixture of both.[16]

TADLP objectives emphasized the need to reduce the time allotted for learning. Since its beginning, TADLP has emphasized the reduction in course length to potentially yield savings in instructor, Temporary Duty (TDY), and facilities costs. For example, DL was employed when TRADOC sought to reduce the length of its BNCOC and ANCOC courses, and when pilot courses were being run to determine whether CCCs could be converted from PCS to TDY courses. It is noteworthy that the resourcing formula for DL content assumes a 30 percent reduction in course hours over the content that it is replacing.

Characteristics of Emerging Courseware

How does emerging courseware compare with active courseware? Are the same characteristics named above present? We defined courses to be "emerging" if they showed enrollments, were funded, or were nominated after FY 2006. At the time of this writing, some previously funded courses had become active during FY 2007 and FY 2008, after our survey of active courseware. Further, new courses were funded in

[16] While we did not have administrative records indicating the component of all course enrollees, we did ask the schools who they saw as the most common enrollee for each course.

FY 2006 and FY 2007, and development activities had begun.[17] For the future, both TRADOC and the ARNG had nominated courses to be funded for FY 2008 through FY 2010, with only a few decisions on FY 2008 funding having been made at the time of this writing. In all, an additional 235 courses, or about 40 per year, have been funded or nominated (and thus could potentially be funded) since our initial analysis.

We did not have the same detail available for emerging courseware that we did for the active courses. However, we were able to obtain some administrative data from ATSC and to conduct interviews with staff regarding FY 2006–2010 high-priority courseware. Analyzing all the courseware funded to date, we reached several conclusions.

On the whole, many characteristics of emerging DL courseware have not changed after 2006, especially with respect to the nature of the courseware and the DL models used. The dominant model of recent and nominated courses has remained asynchronous, self-paced IMI, used as part of a phased learning model. The median module length is still about 60 hours, with little or no student-instructor contact planned in the DL phase. Modules have continued to aim primarily at knowledge and comprehension learning levels. Expected student load has continued to vary considerably, but for most courses it has remained relatively low, with the median about 250 students per course.

Some trends began before FY 2006 but are noteworthy for their continuation after FY 2006. For example, the percentage of high-priority courses funded under TADLP has gone down considerably from the earlier years, even though there is still considerable unmet need for shortening of the residential portion of those courses. While nearly all TADLP courses funded before FY 2003 were high priority, the percentage subsequently dropped to about 50 percent of the funded courses in FY 2004 and has remained at that level since. This trend indicates that in the later years of TADLP, schools have been more apt to target DL for other than highest-priority courses. To cite another

[17] DL courses are generally referred to according to their year of funding. Because courses take several years to develop, courses funded in FY 2006 and after are not yet or only just beginning to become active (i.e., open to enrollments) at the end of FY 2008.

example, we found that starting in FY 2005, a significant proportion of TADLP-funded modules represented maintenance or redesign of previously funded courses rather than new efforts. From FY 2005–2007, 40 percent of all funded courses focused on maintaining or redoing prior DL content rather than developing new DL content. The trend appears to continue in FY 2008.

The biggest difference between courseware funded pre- and post-FY 2006 was an increase in the percentage of funded ANCOCs and BNCOCs in FY 2006, reflecting an increased emphasis on Professional Military Education. Moreover, emerging NCOES (and some functional) DL courses now appear aimed at NCOs in the AC, not just those in the RC. This marks a shift in emphasis of DL to include more AC participation.

Some evidence points to the emergence of other types of changes in TADLP courseware. For example, some Level 4 IMI courses, which typically consist of a simulation or some gaming exercises, are being funded; in FY 2006 and 2007, Level 4 IMI accounted for 5 percent of the DL hours funded.[18] Additional forms of student support are also emerging; for example, the Armor School, after completing a pilot, requested and received authorization for RC instructor support for its RC DL courses. Under this authority, RC instructors can be assigned to an RC school to actively monitor the progress of students taking DL phases.

In addition, we see some experimentation with blended learning models, in which collaborative DL[19] technologies play a significant role in the delivery, and instructors play a greatly increased role in the training. For example, AMEDD has proposed its own blended learning model to be used in residential training. Outside TADLP, TRADOC is piloting what amounts to a new distributed blended learning model in its BNCOC Common Core course, modeled after

[18] In general, IMI levels refer to the degree the student must interact with the IMI material, with IMI Level 1 being the lowest and IMI Level 4 the highest. For a complete definition of IMI levels, see the next chapter.

[19] "Collaborative DL" is an umbrella term for a variety of approaches to DL that involve joint intellectual effort by students or students and instructors.

an ANCOC course developed by Special Forces. Salient features of this new approach to DL compared to the traditional Army model are that (1) a significant portion of the course uses asynchronous collaborative DL methods (2) the IMI portion of the course has increased instructor support in delivery, and (3) the IMI portion is developed by DL instructors rather than by contractors. These new efforts will be further discussed later in this report.

Army Learning Management System (ALMS)

We now describe the ALMS, which TRADOC is implementing to manage DL and support resident instruction. The goal of the ALMS is to standardize and centralize learning management efforts in TRADOC schools and thus better support worldwide access to, and tracking of, training activities, materials, and resources. Such management capabilities have been increasingly cited as a key need for medium-to-large organizations with multiple training and professional development requirements that are dispersed around the world (Schank, 2002). The potential advantages of a centralized LMS include, but are not limited to:

- Cost savings from reductions in license fees and in development/maintenance/support costs for software.
- Ease of use for employees from single user interface, consistency of data, and access across all parts of the organization.
- Improved data visibility and accountability to the central training organization to evaluate course usage and return on investment from training expenditures.

Development of ALMS

TRADOC's centralization of learning management capabilities is being carried out via the design, development, and deployment of the ALMS. As explained earlier, the need for the ALMS was identified by

the TCM in his role as combat developer, and the solution was developed by PM DLS in its role as materiel developer.[20]

The ALMS has been designed not as a single system, but as a suite of integrated tools to meet a set of required capabilities. The system requirements for ALMS development, through "Increment 3" of the DLS incremental acquisition approach, include the capabilities (called "Learning Lifecycle Features") shown in Table 2.1.[21] As the table indicates, the breadth and depth of these specified capabilities are greater than most corporate demands for learning management support, and thus require more integrated features than commercial LMS applications.

The ALMS is expected to serve a broader role than that of a commercial or corporate LMS, which traditionally provides the support for administering and tracking both DL and classroom-based instruction, as well as providing access to and tracking use of IMI instructional materials.[22] The Army's definition of capabilities also includes aspects of a "learning content management system" (e.g., "product catalog" of learning objects), as well as collaboration tools for DL delivery.

The Army materiel developer, PM DLS, selected commercial off-the-shelf (COTS) solutions to meet the requirements in Table 2.1, and

---

[20] The Operational Requirements Document (ORD) for the ALMS was published in 1999 and revised in 2002. The ALMS "Engineering and Manufacturing Development (EMD)" began August 2000, with the COTS vendor-selection process taking place in 2001. Production of the ALMS began in September 2004.

[21] Note that while career tracking or management is sometimes discussed in the context of the ALMS, at the time these requirements were specified they did not call for that capability.

[22] Although the technical definitions of learning management systems vary widely, Rossett (2002), the American Society for Training and Development's *E-Learning Handbook,* defines a learning management system as "Software that automates the administration of training events. The LMS registers users, tracks courses in a catalog, and records data from learners; it also provides appropriate reports to management. The database capabilities of the LMS extend to additional functions such as company management, online assessments, personalization, and other resources." The handbook goes on to state that "Learning management systems administer and track both online and classroom-based learning events, as well as other training processes (these would need to be manually entered into the system for tracking purposes). An LMS is typically designed for multiple publishers and providers. It usually does not include its own authoring capabilities; instead it focuses on managing courses created from a variety of other sources."

Table 2.1
Learning Lifecycle Features of ALMS

Course Catalog: A "unified, on-line central directory for Department of Army (DA) course offerings. Learners will be able to locate and register for courses and initiate e-courses."

Product Catalog: An "on-line central directory" allowing learners and course developers to order two types of products:

- Learning support products for learners.
- Learning objects for course developers (e.g., items created, reused, and combined to create courses, phases, modules, lessons, activities, or media).

Registration: A capability to make a "reservation to attend a training event (e.g., resident, nonresident)."

Resource and Event Scheduling: Allows "planning training events (e.g., synchronous) and arranging for resources (e.g., supplies, facilities, instructors) to support the event." A training event may include:

- Resident education/training.
- Nonresident education/training.
- Special events.

Product Distribution: Involves "the distribution of courseware and products to Learners, Instructors and Class Managers."

Training Delivery: Supports the "full cycle of the training event. The cycle begins when the Learner arrives for resident training or receives nonresident training materials and ends with the completion of instruction and the update of the Learner's Individual Training Record (ITR)."

Testing: Includes "measuring knowledge, learning, and proficiency in order to meet defined learning objectives. Testing involves the compilation and instantiation, administration, scoring, and recording of a Learner's assessed performance competence."

Collaboration: "Tools enhance the learning experience by enabling Learners and Instructors to bridge distances in geography and time. They provide a means of virtually engaging in learning events and knowledge sharing through a synchronous, real-time exchange or an asynchronous, non real-time exchange."

Evaluation: The collection of course-related feedback from the Learner during or after the completion of a learning event. Evaluation involves the creation, administration and recording of the Learner's experience with instructional materials, Instructors and the application of newly acquired skills."

Training Management: "Defines future, standardized requirements of DLS to collect, process, and output information on the testing of courseware, maintaining the currency of courseware information, and supporting asset management to ensure the successful execution of training events."

Course Scheduling: "Defines a specific instance of a course (i.e., course iteration) and includes the date, times and location of the event. Course scheduling applies to resident and nonresident training events."

has carried out acquisition and integration of applications up through ALMS, Version 2.0. These COTS applications and suites of applications provide a variety of capabilities to satisfy the requirements of the DLS Increment 3 ALMS specifications:

- Saba Enterprise 5.3 Learning Suite:
  - Origins in commercial e-learning, broadened market to include academic use.
- Blackboard Academic Suite, Enterprise:
  - Origins in academic institutional use, now a leading LMS for both academic and commercial training organizations.
- Saba "Centra" for collaboration:
  - Application provides "virtual classroom" learning (synchronous or asynchronous if recorded synchronous session is later viewed as a movie), e-meeting, and Web seminar platform with a learning content management capability. Also capable of including video for collaboration, or a version of "desktop video teleconference."

Any integration effort for a suite of COTS solutions from different providers results in overlapping features offered by the competing applications. Given that each application is implemented in a particular way, the overlap in solutions allows organizations to choose which application will most effectively meet their local LMS needs.

Status of ALMS Use

Considering the low impact of high-priority courseware in training thus far, we did not attempt to gather specific information about how many of those courses were supported out of the ALMS. However, from interviews, we determined the overall status of data availability for this part of the DL program.

While several hundred courses were loaded into the ALMS at the end of FY 2007, few were of the high-priority type that is the focus of this study. Migration of DL courses supported by other LMSs to

the ALMS is an objective of a number of initiatives. Once courses are loaded onto the ALMS, usage data will be more readily available.

Future Directions of ALMS

The DLS Increment 3, "Automated Student Management," was scheduled to move into the final implementation task of "Post-Deployment System Support" on September 27, 2004. The system was completely fielded but not widely in use. Full implementation requires completion of transition activities (e.g., migration of courses from the existing LMS to the ALMS) at each school.

The PM DLS has developed and implemented a structured "change management process" for ALMS software revisions. This is the process by which PM DLS collects feedback from users and proponent schools via a "change request," works with the TCM to evaluate and prioritize possible changes, and determines the costs of these changes. Such changes can include (from the ALMS Engineering Change Proposal website[23]):

- User-viewpoint observations of undesirable system behavior.
- Suggestions for improvements on existing processes.
- Ideas for new functions or processes.
- Requests for information about a particular feature.
- Problems in following user documentation (Help files).

Once changes are approved by the TCM and funded, a requested change is moved through the software development process to implement the change.

The DLS has moved on to Increment 4 development (the final increment), which does not appear to provide any additional capabilities to the ALMS features specified above. Instead, this increment focuses on the development of "Deployed Digital Training Campuses" (DDTCs), described in the next section.

---

[23] https://www.dls.army.mil/CR_Process.html

DL Facilities

The Army DL program also supports a worldwide network of facilities that allow access to distributed learning. As of the end of FY 2007, these include the following:

- **Digital Training Facilities (DTFs):** About 230 DTFs exist on a few more than 90 CONUS (continental United States) and OCONUS (outside the continental United States) installations. The facilities support DL access (about 3,500 workstations), video teletraining receipt, and video conferencing.
- **ARNG DL Classrooms:** About 340 ARNG DL classrooms throughout the 54 states and territories, many of which support interactive courses involving face-to-face student-instructor contact.
- **Classroom XXI:** About 84 classrooms on TRADOC school installations supporting resident training and with the capability to receive and transmit DL courses.
- **Deployed Digital Training Campuses:** Eventually, around 50 mobile, networked systems to train soldiers who are outside CONUS and who cannot gain access to other facilities. Two are planned for each Army division, with others held in reserve for surge support. The systems consist of about 20 notebook computers, a server and printer, and equipment to transfer digital information to and from satellites.

These facilities typically serve as more than a location where soldiers can take TADLP courses. For example, DTFs provide "support of ongoing operations" and "required mission immediate training for mobilization, activation, and deployment." Part of the purpose of the ARNG DL classrooms is to enhance mobilization capabilities and facilitate command and control. The Classroom XXIs generally support residential training at TRADOC schools. Further, new uses for DL facilities emerge regularly.

Available data on facilities focus on calculating the usage of facilities to ensure that there is enough justification for their continued

funding. However, at the time of this study, systematic data were not collected with regard to the specific purposes customers have for the facilities they use. While logs would allow the compilation of some general categories of usage, it was not possible to calculate all the instances in which facilities were used for structured institutional courses, such as reclassification courses, ANCOCs, or BNCOCs.

IMI Development Process Description

In this section we review the process for IMI production used by TADLP at the end of FY 2007. This description is included as a "feature" of TADLP because it is important background for a number of our recommendations. The Army's IMI development process is documented in TRADOC Pamphlets 350-70-12, *Distributed Learning—Managing Courseware Production and Implementation*, and 350-70-2, *Multimedia Courseware Development Guide.* These publications provide detailed guidance on the following phases of taking an IMI course from a "need" to an implemented course being used by soldiers:

- Courseware production pre-award phase.
- Courseware production development phase.
- Courseware production fielding phase.

This guidance is aligned with the Army's broader "Systems Approach to Training" (SAT) training development process documented in TRADOC Regulation 350-70, *Systems Approach to Training Management, Processes, and Products.*[24] The general process is described as "a systematic, iterative, spiral approach to making collective, individual, and self-development education/training decisions for the Army." It is this process that ATSC follows in the production of TADLP courseware.

To facilitate better understanding of the Army's process for developing IMI, our project sought to identify the key steps in the "end-to-

[24] TRADOC Regulation 350-70 and the supporting pamphlets are currently undergoing significant revision.

end" IMI development process. This process reflects the perspectives of each stakeholder in the process, e.g., the proponent school with the need for the course, TRADOC's need for financial authority and accountability, and course developers' need for information and collaboration.

To complete our "process mapping," we took into account the guidance in TRADOC Pamphlet 350-70-12 (referenced above), as well as information and data from interviews with Army civilians at ATSC, and interviews with training developers and instructors at the a number of the Army's proponent schools.

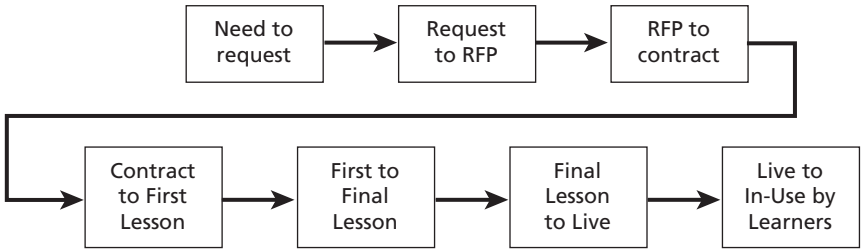
An important part of any process mapping is finding discrete points in that process where important events can be identified and time-stamped. We divided the Army's IMI development process into two major segments. The first segment encompasses all the activities from when the school first has a perceived need for an IMI course through a signed contract for the work to develop the course. While early on some DL courses were developed within the schoolhouse, virtually all DL content funded under TADLP is now produced by TRADOC-approved contractors with the support of the schools. The second segment covers all activities from the signing of the contract (or delivery order) until the time when there are actual Army learners using the IMI content.

The top row of Figure 2.1 below shows the main activities in the first major segment: from perceived need for the course to signed delivery order. This segment is also referred to as the "courseware production pre-award phase" of the DL development. Although the processes shown in Figure 2.1 appear to be simple in this representation, the actual underlying processes are complex, with many steps and many supporting documents and stakeholders.

The first step is for the schools to identify a need within a course for an appropriate piece of the curriculum to be developed using IMI. TRADOC Regulation 350-70, II-9-6, contains general "media selection guidelines" with factors for consideration of "training effectiveness," "DL facility location and capabilities," "affordability," and "budget limitations."

Once the school has assessed a need for course content that can be filled appropriately by a piece of IMI courseware, the school must

Figure 2.1
Army DL Development Process Lifecycle



RAND *MG1016-2.1*

officially "nominate" that content for development into IMI products via TRADOC's TADLP prioritization process. Once nominated, a potential IMI course component becomes part of a list at TRADOC that is reviewed, that ranks the courses according to their importance, and that will be used to determine which courses will be funded. Funding decisions are based on a set of criteria for course necessities that includes, among other criteria, the estimated number of users over the lifecycle of the course, the importance of the course content, and costs. Since this selection process takes place in the February–March time frame and occurs only once per year, there is an average wait of six months for a course to be selected from the time when the school identifies a need for the course.

Once course prioritization decisions are made, the schools must start the process of producing a delivery order (DO); develop and submit course administrative data (CAD); provide government furnished information (GFI) and government furnished material (GFM) that provides full documentation of the course, including goals, training support packages, methods, and assessments; and also submit responses to a number of supplemental questions. These documents then flow through the various contracting offices for review, supplementing as needed using various forms, and approvals. Eventually a contracting officer (KO) approves a purchase order for the course development, and the contracting office sends requests for proposals (RFPs) to a list of approved contractors. These contractors then submit

their proposals for course development. These proposals are based on previously negotiated rates of dollars per hour for content development for different levels of IMI, and they are independent of the content area in any specific RFP. The KO then has a technical review board review the proposals from the contractors, and finally the KO awards the contracts. These contracts are classified as "fixed price," meaning the requirements are clearly specified in advance, with the contractor expected to provide the IMI product at the cost fixed in the contract. The final awards and contract signatures are traditionally made in the closing weeks of the fiscal year. This completes the first major step of the IMI development process.

The next major segment of the DL development process takes us from contract signature and work commencement to the time when Army learners are actually using the courseware. This segment of the process, the second line of boxes in Figure 2.1, involves fewer documents and stakeholders and is less complex administratively, from the perspective of the Army.

After the contract is awarded, the "development phase" of the process begins. This phase starts with a post-award "kickoff" meeting between the contractor and representatives from both the proponent school and ATSC. At this meeting, the contractors get their first views of the quality/quantity of GFI provided for the course. The contractors are required to identify subject matter experts (SMEs) to support the course development and submit resumes for review by the schools.

The contractor then prepares a number of courseware development planning and execution documents based on the GFI, the kickoff meeting, and subsequent communications with proponent school and ATSC representatives. These include a milestone schedule, a validation plan, a test and evaluation plan, a student evaluation plan, an instructional media design package (IMDP), and a prototype lesson that demonstrates understanding of the educational and technical requirements of the courseware. Once these documents are reviewed by the proponent schools and ATSC courseware manager and subsequently approved, courseware development begins.

Contractor development processes vary by contractor and proponent school. Lessons are developed by the contractor for the school

either individually or in small numbers and submitted for approval by the proponent school (with a 10-day suspense time). If approved, the lessons are submitted for testing by the Courseware Certification Team (CCT) at ATSC for basic technical testing. The testing at this point does not include Sharable Content Object Reference Model (SCORM) conformance[25] or ALMS certification. As a lesson, or sometimes a small number of lessons, is approved and passes testing, payment is made to the contractor for those completed lessons.

When all lessons have been approved and passed initial testing, the entire set of lessons is submitted as delivery of a completed final course. The full course is then submitted to CCT for full SCORM testing and ALMS compliance. When the cycle of testing, reporting issues, contractors addressing issues, and retesting has been completed, the course is uploaded to the ALMS and is available for access by Army learners. At this time also the final contract payments are made and the contract closed. The courses have a six-month warranty period for reporting defects after the contract has been closed. There is then some period of time between when the course is "completed" from a contractual standpoint, and when that course is used by Army learners. This is sometimes due to the demand cycle for the IMI component of a course: some courses are offered only once a year by a school, so the newly delivered IMI is not used until that phase of the next course offering comes up on the school's training schedule.

Summing up the second major segment of the IMI development process, we can say that the process has fewer steps and stakeholders than the first segment, but requires more interaction by contractors and proponent schools. Moreover, there are important testing and quality assurance steps by TRADOC DL organizations late in the process as the IMI materials are certified to conform to standards and to load and function appropriately with learning management systems.

---

[25] SCORM is a collection of standards and specifications for web-based e-learning.

Chapter Summary

TADLP, in sum, is primarily composed of IMI courseware, an ALMS, and facilities that can support learners taking DL courses. In this chapter we have described the funding, features, and characteristics of each of those components in the FY 2006–2008 time frame. Our emphasis has been on courseware, which we argue is the program's key component and which we thus make the primary focus of this report. This description will serve as context and background for our assessment of the current state of DL, and for our recommendations with regard to improvements.

CHAPTER THREE

The State of Army DL

Now that we have established the context for TADLP, we describe the state of DL as of FY 2006, addressing the first purpose of the project and the first stage of our analysis as presented in Figure 1.2.[1] In keeping with our focus on courseware, we report results for the five measures of effectiveness we developed. The first three areas listed below concern DL outcomes, while the remaining two concern the process of developing courseware:

- **Program impact:** What has been the impact of TADLP courseware in terms of number of courses developed, students served, and training hours conducted? To what extent has TADLP courseware become a part of Army training?
- **Efficiency:** How efficiently have TADLP's course development resources been utilized, based on the impact of courseware and other intermediary outputs relative to costs?
- **Quality:** What has been the quality of courseware output?
- **Cycle time:** How much time has been required for courseware production?
- **Responsiveness:** How readily can the process for producing courseware adapt in response to changing requirements?

Information about all these measures is important to understanding the state of TADLP. Findings from these measures will provide the

[1] We also determined that the trends we saw in the FY 2006 data did not change markedly through FY 2008, the end of our assessment period.

basis for further analyses and recommended improvements to the IMI program, which will be presented in Chapter Four. Given that a system of overarching metrics did not exist prior to our assessment, the data presented below can also be used to establish a baseline of performance for tracking future improvements.

Program Impact

We first consider the impact of the DL program on Army training. We looked at the number of courses provided, the students served (AC and/or RC), and the number of training hours conducted compared to those used for residential training.

Number of Active DL Courses Is Small

Our survey of DL courses provided information about the number and type of "priority one" DL courses active in FY 2006. We focused on priority one courses because of the key role these courses play in the Army Training and Leader Development Strategy (ATLDS) and because they have represented an Army focus in its DL program to date. This survey relied not only on records from the Army Training Requirements and Resources System (ATRRS) but also on queries to proponent schools about courses or enrollments that may not have been listed on ATRRS. Key findings are represented in Figure 3.1 and summarized below.

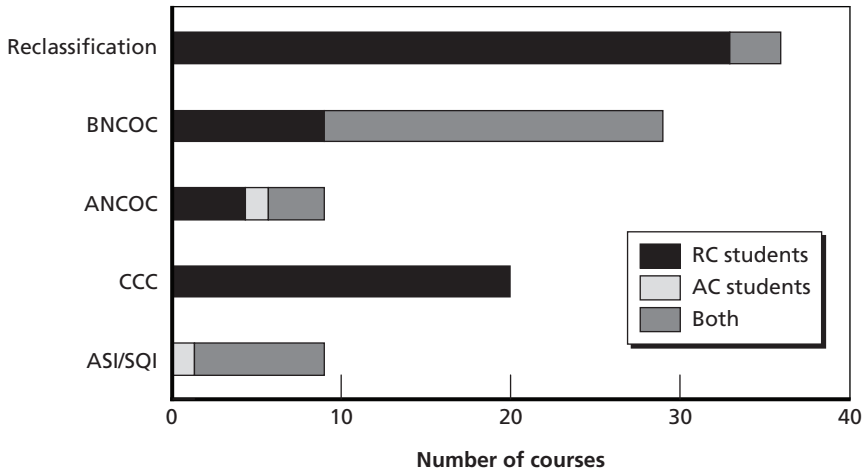
During FY 2006, 103 DL courses or modules within priority one categories were in use (i.e., had enrollments).[2] Of these, about 92 appear[3] to have been funded through TADLP and the active component.[4] As shown in Figure 3.1, reclassification courses were the most

[2] Active correspondence courses were excluded from this count, unless they were a course requirement. Functional DL courses were also excluded, unless they had an ASI or SQI designation.

[3] Since there is no unique identifier given to a DL course funded through TADLP, it is sometimes difficult to determine whether a course in ATRRS was created through the program or not.

[4] Most of the remainder were funded by the ARNG, which in recent years has obtained independent funding for the production of digital training content.

Figure 3.1
Number and Type of DL Priority One Courses in FY 2006



RAND *MG1016-3.1*

common subject matter for DL courseware, and ANCOC and ASI/SQI courses the least common.

Limited Use of DL for AC

Most DL instruction was taken by RC soldiers. Figure 3.1 also indicates that RC soldiers and leaders were the most common targeted audience for DL courses, especially in reclassification and Captains Career courses.[5] AC students were almost never the primary enrollees of a DL course. However, DL courses in the BNCOC and ASI/SQI categories often had a mixture of both AC and RC students. Overall, schools reported that AC students had some level of participation in 35 percent of the active DL courses.

[5] Although we did not have administrative records indicating the component of course enrollees, we did ask the schools who they saw as the most common enrollee for each course.

DL Amounts to a Small Percentage of Training

DL courses accounted for only a small percentage of structured training courses offered by the Army. Across the five types of courses considered, DL training accounted for less than 6 percent of all training hours[6] across all course categories except ASI/SQI (see Figure 3.2). Courses in this category, particularly the Battle Staff Course and the First Sergeant Course, represented some of the biggest success stories for DL.[7] However, DL was seldom used in the other four categories of courses. In ANCOC, for example, DL accounted for only about 6 percent of all the training. The lowest percentage of DL courseware was for the reclassification category, which accounted for only 2 percent of total training. This result is somewhat surprising, since reclassification for the RC was intended to be a focus of TADLP from its inception.

While the percentage of DL courses in total training is clearly less than desired, it is not clear what an optimum percentage would be. We found some targets in *TADLP Campaign Plan,* a 2001 publication that provides an example of the vision the Army has for DL eventually. The report stated that one "critical" indicator of success would be for DL to satisfy "between 30–65 percent of the quota-managed training load" (see Section 1.9.4 of the plan). Figure 3.2 displays that goal relative to what has been achieved.

Efficiency of Utilization of Courseware Resources

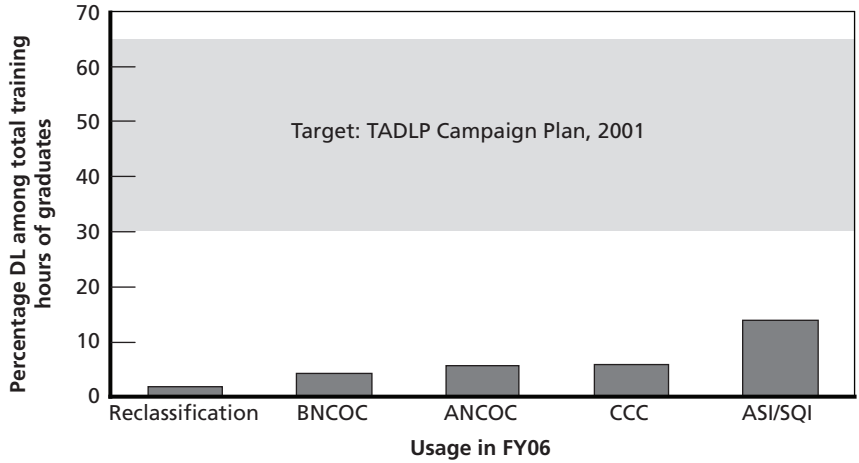
We now consider the efficiency of DL courseware production. Efficiency in courseware production can be viewed in terms of *the cost of content development per hour of training executed*. While readiness needs might, in some instances, warrant investing in IMI to train only a few students, an efficient program would typically develop DL courses that

---

[6] "Training hours" in a category were calculated by taking the product of course length times the number of FY 2006 graduates for each course, then summing over all courses in the category.

[7] It should be noted that these DL courses use VTT as the main delivery mode, and VTT courseware is not developed under TADLP.

Figure 3.2
DL Training Hours as a Percentage of All Training (FY 2006)



SOURCE: ATRRS FY06.

RAND *MG1016-3.2*

offer a high return on investment (ROI), that is, content with likely high usage and relatively low cost. While we did not attempt a formal calculation of ROI, we did look at both cost and usage, and we used a comparative approach to draw conclusions about efficiency.[8]

Cost per Hour Is Relatively Low

We first looked at the cost aspect of efficiency; that is, the cost the Army paid for its development contracts. (Later in this chapter we examine what the Army was able to achieve as a result of its investment.) To attain some perspective with regard to cost, we compared what the Army paid to what is typically paid in the commercial sector for comparable content. In order to compare content requiring about the same level of effort to develop, we divided courses into two catego-

[8] At DA level, the primary metric for evaluating courseware within TADLP has historically been the "number of courses produced." However, a recent initiative to produce additional metrics has called for employing courseware "usage" as a measure directly related to efficiency.

ries: Level 2 or Level 3 (grouped together) and Level 4, as defined by the Army. The Army defines four levels of IMI:

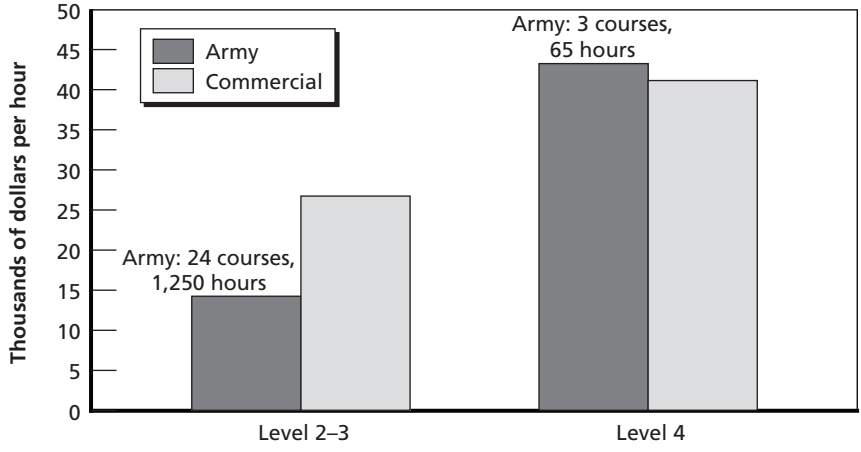
- **Level 1 IMI** signifies that the learner is a passive recipient of information.
- **Level 2 IMI** involves more learner interaction and control over lesson activities, e.g., clicking on icons to reveal information, moving objects on the screen, filling in forms, and answering questions.
- **Level 3 IMI** includes more involved participation, such as the use of scenarios for testing, the need for the learner to make decisions, and more complex branching based on the learner's responses.
- **Level 4 IMI** goes even further toward immersive participation and, in particular, involves simulations.

The industry survey did not use exactly the same definitions for levels of activity as the Army did for the levels below 4. However, we assigned a Level 2–3 to correspond to the following industry definition: Involves sophisticated navigational controls and mid-level interaction with the content, with at least 20 percent of content devoted to very interactive learning activities (such as discovery exercises, drag-and-drop exercises, etc.). Figure 3.3 shows the result of the comparison of Level 2–3 and Level 4 IMI.

The Army was able to negotiate a favorable price for its DL courses. For the bulk of its content (Level 2–3), the Army paid much less, on average, than the commercial sector. The bars on the left of the figure show that the Army paid an average of $14,000 per hour for Level 2–3 interactivity, whereas commercial customers paid about $26,000 per hour, almost twice as much.[9] Average prices for Level 4 IMI were about the same for the Army as in the commercial sector (see the set of bars on the right), although the small sample sizes make this comparison tentative.

[9] The commercial prices, which came from a variety of vendors in a variety of contracts, also had larger variances associated with the average. In the case of the Army, a single customer with relatively similar needs across delivery orders, the actual price varied from $10,000 per academic hour to about $22,000.

Figure 3.3
Comparison of Average Army and Commercial Costs for IMI



RAND *MG1016-3.3*

The lower costs paid by the Army make sense in light of the potential buying power of the Army compared to the average industry buyer. It appears that the Army has been able to negotiate relatively low prices due to its size.

However, other factors must also be considered in order to determine the overall efficiency of the Army program. First, this metric needs to be considered in the light of the quality of courseware that is produced, a subject that we take up later in this chapter. If the output does not measure up to all the Army standards, the low prices may not lead to any ultimate benefit. Second, there is a question of whether the Army is investing in content for which usage is likely to be high. If only a small number of students are using DL content, then even the low prices paid by the Army will be relatively high on a usage basis. We take up the effect of "usage" on efficiency below.

Most DL Courses Do Not Produce Graduates or Are Withdrawn Shortly After Fielding

Administrative data collected by ATSC regarding the status of Army IMI development efforts can provide additional insights into the value

the Army receives for its DL investments, particularly in terms of usage. ATSC uses a number of "status" categories for its DL efforts which can be used to define alternative dispositions for courses. Below we define the categories we were able to create:

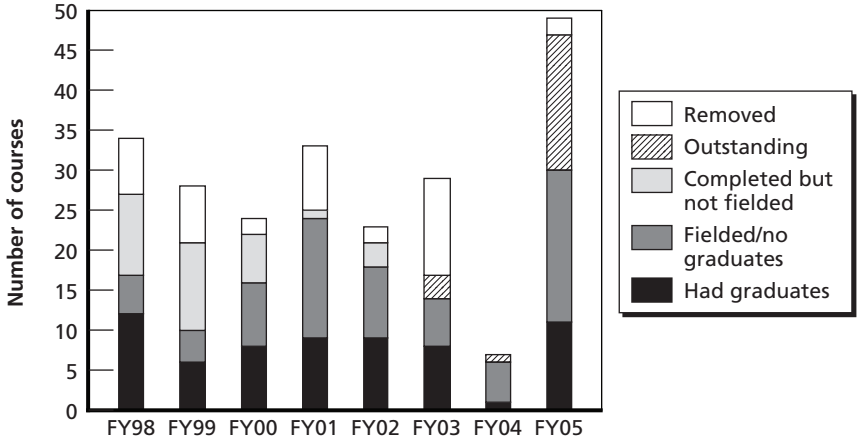
- **Removed:** Courses were abandoned before completion, excluding those that were nominated but dropped because funding never became available. In some cases significant resources were expended before abandonment, but in other cases expenditures may have been minimal.
- **Outstanding:** These courses were still in progress for development (as of the first quarter of FY 2008).
- **Completed but not fielded:** While ATSC shows that the courseware was finished and approved, the content for these courses was never fielded (i.e., offered to potential students) by the proponent school.
- **Fielded:** Here ATSC records show that the courseware was fielded by the school.

Whether fielded courses produced graduates or not can be determined from ATRRS data records for all DA-required courses. Because usage is not always recorded in ATTRS for all DL courses, we restricted our assessment to the priority one courses that were the focus of our analysis, that is, reclassification courses, BNCOC and ANCOC courses, Captains Career Courses, and key functional courses. Of the 375 course modules funded under TADLP through the end of FY 2005, 227, or about 60 percent, were within our priority one categories of interest.

Results of this analysis are shown in Figure 3.4. Each bar represents the total number of priority one courses funded by year from FY 1998 through FY 2005.[10] The segments of each bar represent the status of the courses as of the end of the first quarter of FY 2008. Conclusions from this analysis are discussed below.

[10] With perhaps a couple of exceptions, all courses funded in FY 2006 and after were still in development by the first quarter of FY 2008.

Figure 3.4
Number of Priority One DL Courses by Graduate Status Category (FY 1998–2005)



RAND *MG1016-3.4*

Only a minority of priority one courses funded by TADLP ever produced graduates. While an average of about 28 courses were developed per year, only an average of 7 of these have had graduates (see the bottom segment of each bar). Most of the remainder of the courses were completed or even fielded, but no graduates were recorded in ATRRS.[11]

In addition to the high percentage of courses that were apparently never used, several efficiency issues also arise among courses that had at least some graduates.

Many successfully developed courses did not last in the field past the first year. From FY 2004 through FY 2006, for example, up to half of courses with graduates or requirements "dropped out" one year later, that is, no enrollments or requirements for that course appeared the

[11] The number of graduates could potentially increase for the years that still have courses outstanding, especially for courses funded in FY 2005. Nineteen fielded courses funded in this year could reasonably still show graduates before becoming obsolete, and another 17 could produce graduates, assuming the courses are completed. However, as explained below, experience has shown that courses that take a long time to develop also become obsolete quickly.

following year. FY 2007, however, showed a potential improvement in the trend, with less than 20 percent of courses dropped for FY 2008.

Fielded DL Courses Have a Low Number of Graduates

DL courses tended to have low graduation rates. Residential courses typically have completion rates over 90 percent, (and many over 95 percent). While not strictly comparable due to differing administrative processes for residential courses,[12] DL modules had completion rates in FY 2006 of 50 to 67 percent, depending on course category. MOS reclassification and BNCOC had completion rates at the low end of the range—about 50 percent, while ANCOC and ASI/SQI courses average at the high end. CCC courses averaged a rate of about 60 percent. While somewhat lower graduation rates in DL courses might be accepted as an inevitable outcome of an "anywhere/anytime" training strategy, the rates shown above are substantially below what would likely be considered an acceptable norm.

The average number of graduates from DL courses was relatively small; in fact, most courses were recorded as used by fewer than 200 graduates in FY 2006. Average course graduation among active DL courses was 422. Since that average was driven by a few courses with graduates in the thousands (e.g., Battle Staff Course, First Sergeant Course, and BNCOC Common Core), the median number of graduates was smaller, fewer than 200 graduates per year. Moreover, 30 percent of the courses produced fewer than 100 graduates a year.[13]

---

[12] Within ATRRS, enrollments for residential courses are defined as those students who arrive at the training location and register. Those who make a reservation for a course but do not show up are measured separately as "no shows." For DL courses, these two groups are both defined as enrollments. Thus, "graduation rates" for DL courses have a somewhat different meaning than they do for residential courses. For example, if a student has a health emergency just before a course begins, his or her lack of participation does not lower the graduation rate in residential courses, but it would for DL courses.

[13] Higher usage rates are typical for DL content in other military organizations. For example, ATRRS shows that the Army Materiel Command (AMC) had average graduations of 750 per course hour, Army DL courses produced outside of TRADOC had an average of 2,750 graduations per course hour, and DL courses within the Defense Acquisition University (DAU) had 3,200 per course hour. Note that these results are measured on a "per course

Other data suggest that the small number of graduates can be traced in part to the choice of courses to convert to DL. An efficient choice of content would, on average, imply that courses with higher student load would be chosen for conversion. An expected higher usage of DL content would allow the initial cost of DL development to be "amortized" over a larger number of trainees, thus yielding a larger ROI. However, data show that for four of the five course categories considered, student load for DL courses was no greater than the student load for residential courses. The only exception was the ASI/SQI category of courses, where DL courses had an average of nearly 1,200 graduates per course hour in FY 2006, nearly six times higher than that of courses in that category not converted to DL.

Quality of Courseware Output

Given the Army's expectation of a large role for DL in training, an important component of TADLP's overall performance is the quality of its IMI courses. An assessment of IMI quality is necessary not only to understand and create a baseline assessment of what the Army has received for its investments in courseware to date, but also to make the case for and manage budgets to make needed quality improvements, and to identify and implement needed improvements to processes that affect quality.

Approaches to Evaluation of Courseware Quality

The most popular approach to training evaluation was proposed by Kirkpatrick (1959, 1994), who identified four levels of training outcomes that might be assessed through an evaluation:

- **Learner reactions** typically are assessed through postcourse surveys of student satisfaction. The satisfaction of learners is the most common measure of reactions (as well as the most common

hour" rather than "per course" basis in order to account for the variation in course length across categories.

method of evaluating training). Surveys can also be conducted of other groups, such as instructors or other school personnel.

- **Learning** refers to student performance in the training program, which can be assessed by measures such as knowledge tests and skills tests, or other measures such as peer ratings (Goldstein, 1991). Later assessments of learning (some time after the completion of training) can be used to assess knowledge retention.
- **Behavior** reflects whether students apply what they learned in training on the job, i.e., through job performance, or other outcomes such as rates of promotion in an organization (Goldstein, 1991). Behavior is also referred to as transfer of training. Ideally, job performance is measured using objective criteria (e.g., production quality or time to complete tasks). Frequently, however, job performance is assessed using subjective supervisory performance ratings.
- **Results** provide information about the effect of a training course or program on organizational outcomes. For example, unit readiness might be used as a measure of results. However, it can be difficult to identify concrete measures of organizational performance and link them with training.

The tests associated with training courses might also be evaluated. Several methods of evaluating training effectiveness depend on having good tests. There are both qualitative (content validation) and quantitative or statistical (e.g., using classical test theory or item response theory) methods for evaluating tests.

Another approach to evaluating training quality, and the focus of our companion report (Straus et al., 2009), is to assess the quality of training materials using external evaluators. In a courseware content analysis, evaluators can review a variety of characteristics of courses, such as the comprehensiveness of the course content, accuracy of information, value of practical exercises, ease of use, and so forth. These criteria are especially important in evaluating DL, as less is known about how to deliver technology-mediated instruction compared to traditional in-person training.

There Is No Effective Program-Wide Evaluation of DL Courseware Quality

As part of our investigation of the quality of DL courseware, we reviewed existing Army regulations (and other documentation) regarding evaluation, and we interviewed training development staff from TRADOC and the proponent schools with regard to different types of training evaluations as described above. We also conducted a pilot study of our own, a content analysis of IMI courseware available to Army learners in the FY 2006–2007 time frame.[14] Our conclusions follow.

We found no effective evaluations at the TADLP level (see Table 3.1). AUTOGEN is the only common system for course quality evaluation across TRADOC schools. AUTOGEN is a program for designing surveys of course effectiveness and administering them to course graduates and graduates' supervisors. Results are not synthesized across schools, however, and for reasons described in detail in Chapter Seven, AUTOGEN does not provide effective assessments of DL course quality. The responsibility for the evaluation of DL quality is decentralized to each school but not systematically applied across all schools. Moreover, responses to interview questions also showed that, in general, evaluations of DL are not comprehensive or systematic, in terms of either the range of training evaluation measures collected or the standardization of measures and synthesis of results across courses or schools (see Table 3.1).

RAND Arroyo Center Evaluation of Courseware Quality

To shed more light on the quality of TADLP courseware, we conducted a content evaluation of a sample of lessons from ten IMI courses fielded under TADLP between 2005 and 2007. We selected a sample of courses, stratified by proponent school and course level. We had online access to two of the courses, and the remaining eight courses were provided on CD. Three evaluators, or "coders," went through the courseware in much the same way a student would. Typically, we

[14] The method and results of this study are presented in detail in a companion document to this report (see Straus et al., 2009).

Table 3.1
Army Evaluation Efforts

Type of Evaluation	Does Army Conduct?
Training content	Yes, but not systematic
Learner reactions	Some, but not systematic
Learning: Pre/post comparisons	Yes, but not systematic
Learning: Knowledge retention	No known efforts
Behavior: Predictive validity	No DL-specific efforts
Results: Unit performance	No known efforts
Test evaluation	Yes, but not systematic
Indirect metrics (see note)	Yes, but limited

NOTE: The term "indirect metrics" refers to measures of effectiveness (e.g., DL usage or cycle time) that might be indirectly related to quality. For example, if DL usage is low, it may be because of poor technical or content quality of courseware.

assessed lessons from the first two to three modules of each course, where we define a module as a general topic area in a course comprising one or more lessons. (Note, however, that terms such as "module," "lesson," and "topic" are used differently by the proponent schools.) In some cases, we selected later modules in the courses to ensure that we evaluated varied content, including instruction of concepts, processes, and procedures, if available. In total, we coded 79 lessons that comprised about 40 percent of the lessons per course, on average, or approximately 190 hours of instruction.

We did not examine the accuracy or comprehensiveness of the content, but rather focused on the instructional design and technical aspects of the courseware. Criteria for the evaluation were compiled and adapted from key sources in the training community, including the American Society of Training Development (ASTD Certification Institute, 2001–2003), the Center for Cognitive Technology at the University of Southern California, and TRADOC. In total, we rated courses based on 50 criteria that reflect technical, production-quality, and pedagogical features of courses. Numerical ratings of these criteria for the courses we evaluated can be found in Straus et al. (2009). We summarize our major findings here.

Although based on a small sample, content analysis points to some significant issues that may exist with regard to DL courseware quality. In general, although a number of courses had strengths with regard to technical features and production quality, the assessment found serious shortcomings in pedagogy. In addition, we found that the majority of lessons (76 percent) were classified as Level 2 IMI or less, even though the contracts in use at the time called for Level 3 IMI.

Technical Features. The strongest features of DL courseware were the technical characteristics of the courses, such as the ease of navigating through the courseware. We identified only two technical features needing substantial improvement. One was the ability to launch courseware without technical assistance. Coders required assistance from RAND technical support to launch most of the courses provided on CD. If Army learners experience similar problems without access to technical support, it is reasonable to expect that many of them will give up, which would be reflected in low completion rates. The second technical feature needing improvement concerned the usability of supplementary instructional resources (i.e., reference materials). Although most courses had a menu through which the learner could easily access Field Manuals (FMs), the concepts on any particular page of instruction were not linked directly to the FM. Therefore, using these resources requires substantial effort on the part of the learners.

Production Quality. Production quality features of DL courseware, i.e., the ways in which the material is presented, were strong in many but not all areas. Narration was easy to understand, courses had minimal irrelevant content, and graphics and text were typically legible. Most courses also included examples of effective use of animation to demonstrate processes and procedures. However, some aspects of the audiovisual features were found to need improvement. Courses were rated as only "moderately effective" in the use of animation/video to demonstrate processes and procedures. Narration, while easy to understand, was often very slow, which inhibited the pace of learning. Significant improvement is also needed in using media to engage learners and in eliminating sensory conflicts.

Pedagogical Features. The pedagogical aspects of the courseware were the most important criteria in our quality assessment. Pedagogical features refer to the quality of the instructional content and processes. Pedagogical strengths of the courses include clear descriptions of lesson objectives, an appropriate order of lessons, clear and comprehensive definitions of concepts, and opportunities for learners to correct their strategies in checks on learning and practical exercises.

Pedagogy was the area most in need of improvement. A pervasive problem in many of the courses was a lack of examples from the job or mission environments; this occurred in the instruction of both concepts and prsocedures. Courses also need to do a better job of demonstrating procedures and providing explanations of why procedures work the way they do, so that learners can better understand the concepts and skills taught and can thus be prepared to adapt their behavior in nonstandard situations. Finally, in most of the courses we evaluated, practical exercises did not provide sufficient opportunity for learners to integrate concepts and to practice procedures; there were typically too few opportunities, and the exercises did not progress from simple to complex problems, nor did they include both part-task and whole-task practice. In short, the courseware was deficient with respect to two critical aspects of training: effective explanations of procedures and opportunities for practice.

While recent or planned changes in TADLP processes (discussed later) may have increased the quality of Army IMI for courses under development, most of these products were not available to learners in the FY 2006 time frame.

Cycle Time for Courseware Production

We now turn to the results of our analysis of the DL production processes. In particular, we examined the amount of time required to produce a DL course in the Army and in the commercial sector. Cycle time directly affects the efficiency of the production process and the responsiveness of DL to changing Army training needs. Moreover,

cycle time indirectly affects courseware quality and value because the currency of the course decreases over time.

As discussed in Chapter Two, we define a complete cycle in the courseware development process as the period between the identification of the DL requirement and the time students begin to use the product. To get a better perspective on the cycle time of TADLP courseware, we compared the end-to-end time for development in the Army to the private sector. To understand the results of this comparison more clearly, we broke the cycle time of the commercial process into the same two major parts as we divided the Army process described in Chapter Two: the time from the identification of the need to the signing of the contract, and the time from contract signing to the first use of the training content.

Commercial courses are often shorter than the multi-week courses designed by the Army (multi-hour as opposed to multi-week). Thus, in our initial effort, we inquired about the time it would take for a typical 10-hour commercially developed effort, and for a 50-hour effort within TADLP. Then, to make the two periods more comparable, we separately estimated the time needed for a commercial company to expand its effort to a full 50 hours. This estimate was less reliable than the first, as the longer course is atypical for commercial projects but was judged sufficient for broad comparisons.[15]

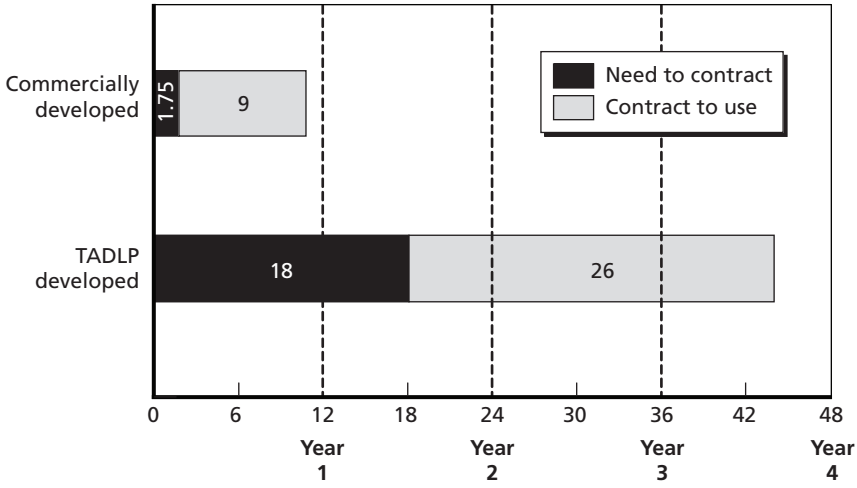
Figure 3.5 shows the results of our analysis, and leads to the following conclusions.

The Army takes significantly longer to develop IMI than do commercial firms. Our analysis found that to develop 50 hours of Level 2 and Level 3 IMI, the Army took over three and a half years, nearly four times as long as commercial firms, which took less than a year (Figure 3.5).

Cycle times in the commercial sector were solicited during interviews with several managers of commercial training development organizations. They indicated it would take less than two months to secure

[15] Commercial firms stated that expanding their effort from 10 to 50 hours would only add a few months to the development time, due to scale economies and their ability to quickly expand (or contract) their effort to fit customer need.

Figure 3.5
Months Needed to Develop Level 2 and Level 3 IMI



RAND *MG1016-3.5*

a contract, and about 9 months for development (Figure 3.5). Data were collected in two stages. First, we asked firms to estimate the time it would take to produce 10 hours of IMI (a more typical length for the commercial sector). In the second stage, we asked those with some experience of large contracts to estimate how much more time it would take to develop 40 more hours after the first 10. All interviewees indicated they would hire extra personnel for a surge effort to complete the extra hours.

Cycle times in the Army were estimated for FY 2006 from actual experience, partially calculated via ATSC records, and partially estimated through interviews of school personnel. The analysis concluded it would take about 18 months to secure a contract, and about another 26 months for soldiers to begin taking the course (Figure 3.5).

The estimate of Army IMI development times in Figure 3.5 includes:

- An assumed average of 6 months from first identification of need for a training IMI product to submission of a "nomination" request to the TRADOC DL courseware process.[16]
- 5.5 months from official nomination by the end of the fiscal year to approval of the course in mid-March.[17]
- 6.5 months from the decision to fund the course to signing a contract by the end of the next fiscal year.[18] The first three steps together constituted the 18-month "need to contract" time shown in Figure 3.5.
- Actual average time from contract start at the beginning of a fiscal year (i.e., in October) to completion of the courseware (including all testing), based on FY 2005 and FY 2006 courseware completion data was about 24 months.[19] This number comes from the actual average time for FY 2005 courseware that is complete.[20]
- An estimate of two months from final delivery of the course to use by soldiers (included as part of the solid gray bar). The last two steps together constituted the 26-month "contract to use" time shown in Figure 3.5.

The biggest difference between the Army and commercial firms was in the time segment from "need to contract," which took more

---

[16] The assumption is that the need on the part of the proponent school could be identified either just before the deadline for submission, or up to 12 months before the deadline; averaging the two numbers yields the 6-month estimate. Note that this calculation does not account for Army policy regarding identifying the need for DL, which is not uniformly followed. TRADOC Regulation 350-70, Chapter II-8, calls for identification of need, and the filing of Course Administrative Data, three years before the funding of the course.

[17] The deadline for submissions is the end of September each year, corresponding to the end of the fiscal year. The annual meeting for selection of DL courseware for development is in mid-March of the following year, or 5.5 months later.

[18] The funding of the DL courseware development has typically taken place in September of the same fiscal year, so from mid-March to the end of September is 6.5 months.

[19] Even though contracts are written as one-year agreements, many courses receive "no cost" extensions that lengthen the contract period. In addition, the time needed for courseware testing at ATSC comes after the contracting period.

[20] Acceptance of ATSC projections of further reductions in cycle time reduced this number by 6 months.

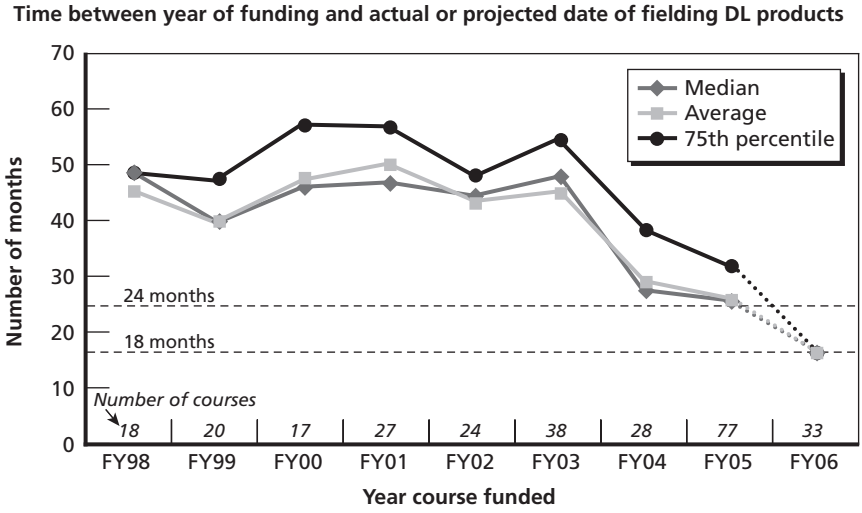
than 10 times as long in the Army (1.75 months versus 18 months). The commercial companies are not often constrained by annual cycles, but instead create new content when it is needed. They are also adept at setting a case-by-case contracting period suited to customer needs and their own capabilities and, when necessary, contracting for short periods of time to produce content quickly.

We also attempted to look at trends in cycle time to estimate future trends. The available administrative data did not allow us to examine the full cycle time, but only the time from the date of the contract to the actual (or estimated) time of fielding, which is about two months before actual use. Trend results for this period are presented in Figure 3.6, which tracks actual development time for courses within TADLP funded from FY 1998 to FY 2005, and estimates that development time for courses funded in FY 2006. The graph shows not only the average times, but also median and 75th percentile times, which provide a sense of the variance and outliers in times. We draw the following conclusions:

Long cycle times from contract to fielding are nothing new in the Army; in fact, times were longer in the years preceding the period evaluated. Even longer cycle times than shown in the previous chart were common nearer the beginning of TADLP; in particular, between FY 1998 and FY 2003, the average yearly development time ranged between 40 and 50 months.

Development times (from contract to fielding) were significantly reduced in the latter part of the period. Improvements began in FY 2004 and continued through FY 2005, where the average number of months fell to below 30. The shortest documented time, 24 months, occurred for courses funded in FY 2005; this was the number used on the previous chart, where the Army was compared to commercial firms. ATSC projects that the time between funding and fielding for FY 2006 courses will approach about a year and a half, but those times could not be verified before completion of this report.

Figure 3.6
Army DL Cycle Time (FY 1998–2006)



SOURCE: ATSC.
NOTE: FY06 downward trend based on ATSC projections.
RAND *MG1016-3.6*

Responsiveness of the Process for Producing Courseware

We now discuss the responsiveness of courseware, which we define as the ease with which courseware can be adapted in response to changing requirements. To examine how responsive, or adaptive, TADLP processes were (by the end of FY 2006) in effecting timely change to courseware products, we focused on three periods through the lifecycle of IMI content: the period from requirement identification to signing of a contract, the period of courseware development, and the post-production period. While there is some overlap in this measure with cycle time (discussed above), the focus here will be on how quickly the Army can turn a new requirement into IMI courseware or change an existing idea without sacrificing training quality or other measures of effectiveness.

IMI courseware is relatively unresponsive to urgent or changing requirements before, during, and after initial development. Starting

from our discussion above on cycle time, when the idea of an IMI product first emerges, the TADLP process does not allow for a rapid path to a contract to produce IMI-based training. In the commercial sector, firms can go from "idea to contract" within weeks or a few months. In the Army, the average time has been over a year. IMI ideas are essentially "batched" in the Army, going into a pool for consideration and potential selection at a prioritization conference that convenes once a year. Then funding is typically further delayed when funds are not received until the end of one fiscal year or the beginning of the next.

While changing an idea before a contract is signed is possible, it can often take a long time to implement. Funding a nominated product requires complete GFI/GFM; these typically are not readily available and often take considerable time to complete initially or to change midway through the process because of the shortage of TRADOC training development resources. GFI and GFM can include an extensive list of documents, equipment, software, facilities, and services. For example, they can include the program of instruction (POI), field manuals, regulations, lesson plans, course management plan, approved critical tasks and task analysis data, graphic training aids, maps, artwork, and video presentations.

Once IMI content begins development in the Army, it is difficult to change the requirement without significant penalty. In the commercial sector, agreements for IMI content can and are routinely changed as development proceeds. In contrast, the Army's product-focused, exclusively fixed-price contracting vehicle makes it almost impossible to make formal changes to the contractor's initial "statement of work." Because there is often a need to change IMI requirements in the Army context, parties have often found a way to informally alter what IMI content is produced, but the change typically comes at the sacrifice of another part of the requirement or timely completion of the product.

Once a course is fielded to the Army, new development to make necessary changes in content has typically not been possible for a number of years, even for development efforts that would require only weeks or months. Again, no such constraints exist in the commercial sector. In the Army context, such changes have been treated as a

request for new content, involving the same waiting period to compete for prioritization and funding.

Chapter Conclusions

The findings presented in this chapter indicate that, after nine years of implementation and a growing need for DL across the Army, the impact of TADLP is still relatively minor. There are clear highlights in the program, such as high use of some courses (especially in the ASI/SQI category) and favorable hourly rates for courseware production. However, in terms of our primary criterion—program impact—the amount of DL training executed is a small proportion of all training, especially for the AC, and the content of the training is relatively basic.

Evaluated using our measures of quality, efficiency, cycle time, and responsiveness, TADLP's relatively small courseware program does not fare well. The typically short lifespan of courseware once it becomes active and low usage rates lead to a small return on investment on the funds expended, despite the relatively low hourly costs the Army has been able to negotiate with contractors. Further, although we were not able to examine all aspects of courseware quality, our sample evaluation suggests areas of deficiency, especially in the pedagogy employed. Finally, long cycle times for production, as well as the difficulties of getting new ideas into production, making changes once production has commenced, and making revisions to existing courses, all add up to a product and process that have an insufficient capability for adapting to and supporting the Army's rapidly increasing and changing needs for course content.

CHAPTER FOUR

Improvements to the IMI Program

The previous chapter identified a number of areas in need of improvement in TADLP's courseware program for IMI. In this chapter we consider some of the underlying issues that led to the outcomes described in Chapter Three. We also present a number of potential near-term improvements to the IMI program that can positively influence TADLP outcomes with regard to the measures of effectiveness presented in Chapter Three.

Five improvement initiatives are proposed in this chapter that focus on the Army's approach to IMI in the FY 2007–2008 time frame. Broader, more strategic initiatives for TADLP are considered in subsequent chapters. These five initiatives cover the span of courseware development, from design through delivery:

- Design of program:
  - Add flexibility to the courseware acquisition strategy (e.g., by decentralizing contract management and administration in appropriate ways) to achieve a range of overall improvements.
  - Allocate sufficient resources per training module for standalone IMI (even if, in the short term, this means funding fewer courses) to promote efficiency, shorten cycle time, and improve quality and responsiveness.
- Before and during development:
  - Undertake systematic process improvements to reduce cycle time.

  - Increase local participation in IMI production and contract administration to reduce cycle time and increase efficiency, quality, and responsiveness.
- After development and during delivery:
  - Institute a program-level IMI evaluation component to improve quality and other measures of effectiveness.

For each area of improvement, we first highlight what we learned about the problem, and then make recommendations for improvement. It should be noted that these recommendations are intended to cut across the issues identified in Chapter Three, not to track them one-to-one. The likely effects of each major recommendation on the measures of effectiveness presented in Chapter Three are summarized in Table 4.8 at the end of this chapter.

Add Flexibility to the Courseware Acquisition Strategy

One of the findings discussed in Chapter Three concerned the general unresponsiveness of TADLP courseware to changing or newly urgent requirements. This problem is particularly apparent in the acquisition process used for IMI courseware, which is the first area of improvement discussed in this chapter.

We recommend a number of near-term and longer-term changes to the Army's IMI acquisition strategy to increase TADLP responsiveness.[1] Further, we argue that these changes would also shorten cycle times and improve efficiency and quality. To provide context for understanding the recommendations, we first briefly discuss the Army's approach to acquisition strategy for IMI.

Issues Regarding the Army's Acquisition Strategy for IMI

The Army's acquisition strategy is composed of three elements. The choices the Army has made regarding these key elements of its

[1] For a more detailed explanation, see a separate unpublished draft by Coombs and Shanley (2008).

acquisition strategy for IMI have contributed to a lack of flexibility and overall effectiveness in TADLP implementation. These elements involve the Army's characterization of the IMI output (courseware), its approach to purchasing courseware content, and the design of the contract vehicle used to acquire courseware. While geared toward low-cost purchases, the Army acquisition strategy is not flexible enough to address many of its IMI requirements as well as a number of its key constraints.

First, the Army designates IMI courseware as a product, a characterization more appropriate for items that are not expected to change. In acquisitions, the output of the acquisition process must be categorized as a product, service, or system. A *product* characterization is typically given when the output of the process is tangible and not expected to change during the procurement period. In contrast, a *service* characterization is more appropriate when tasks are not as well defined, and a *system* characterization is appropriate when the final product is expected to be greater than the sum of its parts, i.e., the capability will be derived from a possibly complex combination of products and services that are potentially subject to significant change over the development period. Although IMI courseware typically needs ongoing updates and changes in response to changing requirements, the Army characterizes the courseware as a product, so from the start, the process is designed *not* to incorporate revisions either during or after development.

Second, the Army uses a "single-step" acquisition approach. The inflexibility of the Army's acquisition process for IMI is also due to the single-step approach used. Such an approach focuses on making a purchase quickly and for a fair price, but it does not include any built-in mechanisms to deal with changing requirements.

An alternative to the single-step approach is the *evolutionary approach*, which takes place over time. One example of an evolutionary approach is an *incremental development approach*, which is typically used when the requirement itself is relatively well known at the outset, but the associated information, resources, and available technology relevant to that requirement are expected to change over the product lifecycle. Another example is a *spiral development approach*, which is used

when even the final requirements are not well known at the time of program initiation.

Finally, the Army uses a firm fixed-price contract type for IMI, which assumes that all requirements are clearly known in advance. The firm fixed-price contract is used in the Army's Distributed Learning Education and Training Products (DLETP) contract suite, a group of six "multiple award, delivery order contracts" (MADOCs). A *fixed-price contract* provides for firm pricing and a well-defined compliance arrangement; typically, the contractor agrees to provide the output regardless of difficulties that might arise during development. Fixed-price contracts, as the name suggests, are designed to resist changes in price.

The Army has several other options for contracting. For example, *cost contracts* provide for reimbursement of a contractor's reasonable costs, whether or not the expenditures result in an output that fulfills the requirement. Cost contracts are typically used when the customer is unclear about the details of the requirement, and is willing to pay the contractor to collaborate and innovate in order to get to the specific solution. Other types of contracts include time and materials, requirements, fixed-price multiple award with time and materials line item, and fixed-price with prospective price redetermination.

The acquisition framework is not flexible enough, leading to adverse impacts on multiple measures of effectiveness for TADLP. The Army's acquisition framework is problematic for several reasons.

First, the presumed level of upfront specificity built into the acquisition strategy often cannot be achieved in practice, resulting in adverse effects on cycle time and courseware quality. The reason upfront specificity cannot be achieved is that requirements for most Army courseware change frequently over the development period, after the delivery order (DO) is signed. Changes derive partly from changes in content and the design of the overall course that IMI phases support and partly from changes with military occupational specialties—realities that are becoming more common over time. But even when content areas are expected to be relatively stable (the Army tries to find such cases when it nominates content for funding), incompletely developed GFI/GFM

often lead to ill-defined requirements and the need for substantial changes during development.

While the effects of anticipated change can sometimes be mitigated by better upfront coordination, the acquisition framework effectively bars Army schools and contractors from discussing and negotiating specifics of proposals before DOs are signed. Under its acquisition strategy, the Army competes every DO among all its prime contractors. In this context, discussions with contractors prior to the DO would represent an administrative burden because, to maintain fairness of the competition, discussions would have to involve all six contractors in every case. Moreover, the time between solicitation and award is short (often only ten days), both because fixed-price product contracts are supposed to be well defined enough not to need further negotiation, and because ATSC typically receives its money for courseware development with little time remaining in the fiscal year to award it.

The reality of change combined with an inflexible framework leads to increases in cycle time and decreases in quality. Both schools and contractors have reported substantial obstacles in making satisfactory adjustments to IMI requirements once a DO is signed. (See Appendix B, in particular the section discussing school-contractor interaction.) Moreover, the informal methods typically used to make change possible in practice often detract from the effectiveness of the content being produced. For example, contractors and schools sometimes negotiate informally to downgrade capabilities (e.g., lower interactivity levels or less content coverage) in some areas in order to accommodate new requirements in other areas. Further, in lieu of changes that would require an increase in the price of an effort, no-cost extensions are often granted, which adversely impact on the cycle time of IMI production.

Courseware maintenance and revision procedures generate additional cycle time challenges that affect course quality and program efficiency. The "single step" and "product" approaches built into the Army strategy basically assume that revisions will not be part of the requirement. As a result, maintenance actions on existing courses in the Army case are typically treated as if they were new acquisitions, requiring a new nomination and selection process and a new competi-

tion for the new work among all the contractors. These processes take years to implement. As a result, schools identified "maintenance" as a major obstacle in the success of TADLP (see Appendix B for specifics). In practice, schools often delay revisions, leading to outdated courseware, or remove the courseware, resulting in less DL contribution to training.

Process issues surrounding acquisition also adversely affect quality, cycle time, and efficiency. Two process issues related to the acquisition strategy also warrant discussion. First, the criteria used in the evaluation and award process are too broad for selecting the best contractor and for taking into account individual school requirements. As a result, DOs nearly always go to the lowest bidder, which will not always be the most cost-effective choice for the government. It is likely that a sizable number of problems identified by schools and contractors in their interaction (see Appendix B) derive from this tendency.

Second, the TRADOC practice of funding IMI at the end of the fiscal year adds to the cycle time by nearly a year. The funding surges that generally occur at the end of the year lead to simultaneous competition of dozens of DOs, ultimately degrading the quality of the DOs that govern IMI development. For example, 42 DOs were competed in the final month of FY 2007, which could have led to as many as 252 proposals to consider if each prime contractor bid on every DO. This kind of surge inevitably places pressure on the schools, contractors, and government staff, leading to inevitable errors and shortcuts in processes that deserve more careful preparation. To the degree that the resulting DOs do not outline the customer's requirements, the responsiveness and speed of delivery will be affected.

Recommendations for Improvement

We propose a both a near-term and a longer-term approach to address the shortcomings of the acquisition strategy for IMI.

Make near-term improvements to the acquisition approach. In the near term, we recommend making improvements that better suit the Army's requirements and constraints. Table 4.1 lists the issues that

Table 4.1
Potential Near-Term Changes to the Army's Acquisition Strategy

Issue	Potential Change
Need to change content during development	Add service tasks to contract
Need to maintain and revise content after development	Adopt practice of "logical follow-on" orders
Choose contractor with "best value," not lowest price	Revise evaluation and award process Eliminate discounted bids

can be addressed in the near term (in the left column) and describes the potential changes to be made (in the right column).[2]

To address the need for more-responsive changes in training content during the development period, the Army could add service tasks to the contract via a "time and materials Contract Line Item Number (CLIN)." The CLIN, which was not legal at the time the original DLETP was designed, would allow changes (e.g., modifications to the DO or an upgrade in technology) to be specified and implemented after the finalization of the DO.[3]

To address the need to maintain and revise content after development, the Army could liberalize the use of logical follow-on orders, including orders above $100,000. Use of these orders could greatly reduce the time it takes to implement a maintenance DO, and it would foster greater efficiency and quality as well. Further, this practice would allow more DL courseware to stay active, increasing the impact of DL on training and thus, ultimately, ROI.

To improve school-contractor relations and further foster higher-quality output, the Army could initiate a revision of the contract evaluation and award process to facilitate the selection of the contractor that represents the "best value" for the government. Under the new

[2] For expanded explanations and additional suggestions on near-term changes, see the separate unpublished draft by Coombs and Shanley (2008).

[3] The Army has recently improved its contracting process by allowing (via what is called an "enhancements CLIN") nonstandard tasks to be added to the delivery order. However, this practice is less flexible than what is proposed here in that it requires that the enhancement be fully defined prior to the signing of the DO. No services after signing are allowed.

process, greater weight would be given to factors relating to superior performance, such as the contractor's expertise in a school's occupational area, or the contractor's past performance with regard to quality, timeliness, and cost control. To implement the change, input would be required from ATSC and TRADOC staff, TRADOC's contracting officer for the current contract, and the proponent schools.

Develop a new acquisition strategy for IMI that better suits the Army's needs for longer-term improvement. While modifying the acquisition strategy can increase efficiency and effectiveness in the near term, additional benefits are possible if the Army begins to develop a new long-term acquisition strategy now, before the five-year DLETP contract expires. The new strategy would be designed to better accommodate the need for flexibility to meet Army needs. The new strategy would have three main components: requirements contracts, selective use of system output designation, and selective use of an incremental acquisition approach.

Adopt requirements contracts. We recommend that the Army adopt a strategy centered around *requirements contracts*, which would "prequalify" a set of prime contractors for DL development to work within separate well-defined areas. Under such an arrangement, several contractors would each earn a separate requirements contract for any future requirements that fall within each unique scope of work over specified periods (usually five years). This would eliminate the need to compete each DO separately. For example, one contractor might develop all medical DL courseware. Courseware requirements could be grouped by proponent or geographical location. The new contract would be structured to provide flexibility depending on the nature of the requirement, and it could have elements that provide incentives for efficiency and quality. A fixed-price CLIN could be incorporated to fund a front-end analysis, which would allow both the Army and contractors to develop a better understanding of the requirement before committing sizable resources on an unclear effort. Performance incentives, which schools noted were often lacking for IMI contracts (see Appendix B), should also be built into the contract, including those that could extend the contract term.

Make selective use of systems output designation. The new strategy would also selectively use a "systems output" philosophy during acquisition planning. Parallel to commercial software procurements, this would mean that the entire lifecycle of the course is considered during the acquisition process, and that total ownership costs—not just development costs—are taken into account. Using such an approach would address the concern regarding courseware maintenance cited by schools (see Appendix B) and reduce the cycle time for maintenance actions. This approach would also help anticipate the need for changes and regular updates to courseware, as well as for post-delivery support, thus increasing overall IMI quality, longevity, and return on investment.

Make selective use of an incremental acquisition approach. The new strategy could also benefit from the selective use of an incremental acquisition approach for complex IMI or for content areas that may be less well defined initially or at risk for doctrinal or technological change over the development period. Under this approach, the overall strategy could include multiple incremental deliverables for each course (e.g., IMI design package, storyboards, production of a beta version, planned revisions). Such an approach can reveal problems before changes become difficult to implement.

This changed acquisition strategy (including all its three components above) has key benefits and promises greater overall effectiveness for Army DL. Because individual DOs would not need to be competed, the administrative burden at ATSC would go down, and the pressures of year-end funding would be alleviated. Further, while the award process would stay centralized (e.g., the Northern Region Contracting Center would continue to serve as the Procuring Contracting Office (PCO) for all TRADOC requirements contracts), contract management and administration could, at least selectively, be decentralized to the schools with regard to issues such as the tailoring of evaluation criteria to schools' needs and the selection of contractors. This option could foster greater school involvement and buy-in and lead to higher-quality DOs that generate fewer problems during the development period.

The new arrangements would also foster continuous teaming and collaboration between schools and contractors. A central need for producing cost-effective output is continuous interaction of SMEs, technical experts, and training development experts. The establishment of longer-term partnerships would promote shorter cycle times, increased quality, and greater responsiveness because the contractor would be better able to recruit an expert staff and develop a better understanding of the customer's needs.

Another benefit of the new strategic framework is that maintenance and revision of existing content would become a routine part of contractors' work, significantly extending the life of the content produced and the ROI of development efforts. Through their long association with particular schools, contractors would develop greater expertise in the relevant subject material and would have additional incentives to invest in that expertise. Finally, the lifecycle focus and learning curve benefits should lead to increased ROI from IMI investments.

The longer-term initiatives (as well as the shorter-term ones) would initially cost more to implement than the present strategy; however, the efficiency, quality, and ROI could greatly increase over time through increased usage of DL courseware, shorter cycle times, and more timely responses to the needs of customers (in this case, the schools).

Finally, the new acquisition strategy for IMI could better prepare the Army to adopt new DL models in the future, which would allow for more decentralization of IMI development. Such decentralization could be accomplished directly through the use of local school staff, or by employing an on-site contractor capability. More decentralized IMI production processes have the capability to achieve further increases in responsiveness and decreases in cycle time for IMI. These options and their benefits are further discussed in the next chapter.

Ensure Sufficient Resources for Stand-Alone IMI

We recommend that the Army increase its allocation of support resources for IMI development and support within TADLP. While TADLP achieved a low cost per hour, the overall return on investment

was low due to low usage, long cycle times, and lack of responsiveness. The basic argument is that while allocation of more resources per hour might reduce the number of hours produced, it would promote better ROI and also improve courseware quality. This action would also be needed to implement recommendations related to the acquisition strategy.

Issues Regarding the Allocation of Resources for IMI

Many of the Army's IMI issues regarding quality and cycle time directly relate to limited school support of IMI development. A basic assumption in the Army's approach to the development and delivery of IMI is that school support will be available to supplement TADLP funding. When resources such as GFI/GFM and SME support are not present, the result is an extended cycle time and compromises in courseware quality. For example, the DL process assumes that a complete and unchanging set of GFI will be available for a relatively straightforward conversion to IMI courseware. When the GFI is incomplete, or when the proponent makes changes or additions during development (as often happens) and no more resources appear available (which is typically the case), the finished product can be delayed, and originally intended capability can be sacrificed.

The models for the production of commercial software also suggest that the Army IMI model is underfunded. The Army model does appear in industry (e.g., providing limited customer support) but is often associated with a high risk of failure. Successful companies have the kind of support suggested in this section.[4]

Our survey of proponent schools supports a conclusion that IMI efforts are underfunded for some tasks. Overall, resourcing issues were cited as a challenge by 100 percent of the schools interviewed about DL, and were identified as a key issue by 60 percent of the schools, more than any other obstacle cited (see Appendix B for further details). The most commonly cited resource issue was "a lack of sufficient or qualified Subject Matter Expert (SME) support," either from the school side, the contractor side, or both. Seventy percent of the 20

[4] For elaboration see Shanley et al. (2005), Chapter 3.

schools interviewed described this issue as an obstacle, and 40 percent cited it as a key issue. While support for SMEs was commonly funded in the award to contractors, according to the schools, many contractors were unable to find SMEs that were sufficiently qualified to meet school expectations. In addition to general SME support, 45 percent of the schools noted specific DL-related tasks for which TADLP did not provide funds, with 10 percent identifying these unresourced tasks as a key issue. Respondents mentioned the following areas as other examples of areas in which resources were potentially lacking:

- Completing up-to-date GFI.
- Specifying the learning objectives the IMI is to achieve.
- Providing institutional support to students (both technical and substantive) sufficient to ensure high participation in the program.
- Providing a school capability for minor maintenance of courseware or the creation of simple DL products that require rapid distribution.
- Providing for quality control processes and assessment of the outcomes of DL training.

Note that the primary funding for these functions comes from the overall resources of the proponent schools rather than from the funding account associated with TADLP.

Navy Success with IMI Supports the Need for Sufficient Resources

Comparison of the Army program with a Navy Initiative also suggests that the Army's DL program could benefit from more support in IMI production. The Navy runs a DL program that, much like TADLP, uses IMI to reduce course lengths in structured institutional training.[5] In contrast to the Army program, the Navy effort has been highly successful and has earned the support of schools, units, and students. Table 4.2 indicates the differences between the Army and Navy courses

[5] The Navy's program differs from the Army's in that the target courses are in the Navy's A-Schools, equivalent to the Advanced Individual Training (AIT) courses used in the Army to train entering soldiers, and that the IMI training takes place in residence rather than from a distance.

Table 4.2
Comparison of Army and Navy Resource Allocation for IMI

Item	Army	Navy
Calculation of course length reduction	30%, taken up front	10–30%, based on analysis
Instructor resources	Greatly reduced	Held constant
Training development resources	Not fully funded	Fully funded
Institutional support to students	• Army Training Help Desk (ATHD) • Little dedicated time at units	• Full support • One-on-one where needed
Course testing and evaluation	• During course development • Some school efforts	• Pilot effort first • Continuous evaluation

with regard to resource support. The table compares elements of the Army's overall focus on both resource and course length reduction with the Navy's focus on ensuring increased value to the operational commander.

As indicated in the first row of the table, the Navy analyzed the content of each course to estimate the amount of time savings to expect on a case-by-case basis. The results of this analysis showed that the course length reductions should range from 10 to 30 percent, depending on the type of training involved. In contrast, the Army avoids the cost of those continuing analyses by using an "across-the-board" resourcing formula that assumes, for that part of the course converted to IMI, course length would drop by 30 percent when residential hours were converted to IMI hours.

The Navy also held the number of instructors constant, assigning one per classroom whether the mode was traditional instruction or IMI instruction within the classroom. Freed by the IMI from platform duties, the Navy instructors worked to ensure course success by mentoring students who were falling behind the required pace or failing tests.

The Navy's decision to hold instructor resources constant despite the instructional capability of the IMI helped ensure that the new and shorter courses would provide equivalent training to the older residential format without undue student attrition. This strategy is in line

with the typical development cycle of technological improvements that promise resource savings. Research has found that the savings are realized not from the introduction provided by technology itself, but from the reengineering of existing processes to capitalize on the technology's strength. Thus, success tends to come in two phases, the first focusing on making the new technology work at least as well as the old technology, and the second focusing on identifying possible resource savings.[6] In the use of IMI in the training context, this means focusing first on achieving equivalent training outcomes, then on reducing course length and other savings. The Army's approach has been to reduce the process to a single step, assuming that all resources could be saved up front while implementing a new training approach with undetermined effects on quality.

Table 4.2 shows additional resources the Navy chose to invest in quality in order to add to the value of the outcome. These include training development, student support, and course assessment.

Recommendations for Improvement

Our assessment leads us to conclude that the Army's IMI approach is not sufficiently resourced on a "per hour" basis. Thus, we recommend that the Army allocate more resources to each training hour it decides to fund. A contractual means for supplying these resources has been discussed in the previous section, under recommendations for changes in the Army's acquisition strategy for courseware.

Provide for additional resource categories. The following resource categories may need to be newly funded or to have an increase in funding:

- SME support.
- GFI production.
- Front-end analysis.
- Instructor support to students during delivery.

[6] For example, in the Navy's case it may turn out that once new processes have evolved, one instructor can be shown to successfully mentor a greater number of students than the number in a typical residential class.

- Improvements and revisions.
- Assessments.

Some of these elements (e.g., need for SME support) were identified by the schools as obstacles to their present IMI efforts. In at least one case (instructor support during delivery), TRADOC has already acknowledged the need. A pilot program involving the Armor School has led to the assignment of reserve component instructors to provide added support to students during the DL phase of the course.

Increases in funding for the elements listed above would appear to make sense given current Army constraints. For example, SME support and resources for the production of improved GFI, at least in some select cases, would understandably be required because schools report that TRADOC does not have a training development capability sufficient to support the production of IMI. Estimates of how much would be needed can be determined through pilot efforts as part of an R&D effort.

Note that this recommendation means bringing more of the support needed for IMI courses within the Management Decision Evaluation Package (MDEP)[7] associated with TADLP, rather than leaving it as an unfunded requirement for the individual schools. Moving more of the funding under the TADLP MDEP would help "fence" funds needed for DL support. For example, to further address the need for sufficient SMEs to assist with training development, the TADLP could generate separate non–personnel services contracts funded out of the TADLP MDEP and overseen by the schools. This approach would give schools more direct control over the use of expert manpower and help alleviate problems of underqualified SMEs performing training development tasks.

Since total resources for the development of DL courseware are not likely to increase, the additional investments proposed would mean that fewer courses will be funded, at least in the short run. However,

[7] MDEPs divide Army programs into subcomponents for the purposes of managing resources in the budgeting process. As a supporting capability for training, TADLP has a designated MDEP through which it receives much of its funding.

the number need not be large, as additional resources are anticipated to represent only a small percentage of total cost. In addition, over the longer term, these investments (properly made) could well result in a higher payback for the program. This could be effected, for example, by increasing the average lifecycle of content, the usage of available products, and the course completion rates.

It is important to note that the Army is not necessarily "stuck" with higher costs per IMI hour and lower amounts of IMI courseware. By broadening its current approach to include both DL development and execution, the Army could bring other costs down to balance out the short-term cost increases while increasing the number of students trained via DL. For example, by the end of the assessment period, the Army is beginning to pursue approaches that couple blended learning with instructor development of appropriate types of IMI courseware. These approaches may well cost less than the investments just discussed and lead to an actual increase in the Army's ability to conduct DL instruction even with current TADLP budgets. These options are discussed in the next chapter of this report.

Undertake More Systematic Process Improvements to Further Reduce Cycle Times

In Chapter Two we reviewed the process for IMI production used by TADLP. As shown in Chapter Three, TRADOC schools require significantly more time than does the commercial sector to carry out all the steps required to create and field new IMI. This remains the case even after accounting for the Army's recent gains in this area. There appears to be an opportunity for the Army to further reduce its cycle time. We recommend that the Army institute a more systematic process improvement effort that will allow for both near-term and ongoing reductions in cycle time. We also recommend some specific changes in the Army's practices in the near term. To the extent that the acquisition strategy and process is redesigned in the future and supporting resources increased (e.g., along the lines discussed in the prior sections), additional opportunities for streamlining processes could also arise.

Issues Regarding Cycle Time

There are a number of known issues that appear to contribute to the long development times that have been identified earlier. We learned of many of these issues through our review of the IMI acquisition and development process and through discussions with TD representatives from the schools and with contractors:

- Nominations for DL conversions are developed through an annual cycle during which a single "batch" of proposals is submitted for a single set of approvals, which are funded at the end of the fiscal year. Conducting the process in this way adds up to a year to the development time.
- The development process has too many steps and has involved frequent changes in policies/practices.
- The process involves many stakeholders and organizations, and many documents and signoffs.
- The process is bureaucratic and inflexible to change or streamlining. For example, the same one-year contract is used for small and large IMI product-development efforts. The process lacks "someone in charge," i.e., a specific person or office with overall authority and responsibility in each school, to manage development and provide continuous feedback/guidance to the contractor to keep development moving.
- Schools lack resources to develop high-quality GFI/GFM, provide SME support during IMI development, or carry out timely reviews of content from contractors. The need for changes often leads to no-cost time extensions or reduced quality.
- Testing for SCORM and ALMS historically has added substantial delays.
- Schools and contractors have inadequate time for the kinds of negotiation and collaboration that could well bring about faster development times.
- Best practices are not shared between schools or contractors.

Such issues are common in legacy processes that have evolved over long periods and have spanned different technologies, organiza-

tional structures/changes, contracting approaches, and management philosophies.

TRADOC has been aware of many of these issues and has implemented a number of initiatives to reduce cycle time, including incrementally testing lessons for SCORM/ALMS compliance in advance of the completion of the entire course, expediting the post-award meeting, reducing the requirements for the instructional media design package (IMDP), and conducting a Lean Six Sigma study on streamlining the courseware testing process. More recently, TRADOC has initiated a "tiger team" approach to understanding and improving the speed of the process. These efforts appear to have led to some recent decreases in IMI product-development times, but the data do not exist to let managers know which of these efforts were the most successful or to guide next steps. Having such information could well be crucial to the design of future initiatives, as ongoing improvements in cycle time will likely require detailed knowledge about the source of delays in the process.

Recommendations for Improvement

Our assessment leads us to the following recommendations for reducing cycle time.

Expand the capability for more systematic process improvements. Whether using a new or existing acquisition strategy, the Army should expand its efforts to engage in more-structured and continuous process improvement to help identify and eliminate or speed up the processes responsible for delays in IMI development. Although there are many methods for implementing continuous improvement, such as Six Sigma or Total Quality Management (TQM),[8] their common basic underlying steps—"define," "measure," and "improve" processes—can also be applied to IMI development.[9]

---

[8] Six Sigma is a business management strategy originated by Motorola, USA that seeks to improve the operational performance of an organization by eliminating variability and waste. TQM is a strategic approach to management aimed at embedding awareness of quality in all organizational processes.

[9] For a number of years, RAND has been involved in developing and implementing very successful process improvement activities with U.S. Army logistics organizations (see Dumond et al., 2001). The same basic processes can apply to IMI development, although

Case studies of process improvement efforts that have succeeded and failed have yielded a short list of required components for success. The effort must have:

- A "champion," a senior leader who "owns" the process at some level and will commit oversight and resources to the hard work of process improvement.
- A cross-functional, empowered "process improvement team" to guide specific improvement efforts; members must include the major stakeholder groups in the process.
- Time and travel resources to carry out process improvement methods, beginning with "process walks" to define the process in detail.
- Strategic and tactical data collection of process performance measures into databases that can be used to assess the success or failure of improvement efforts.
- Continuous monitoring and improvement.

Table 4.3 shows the main steps in continuous process improvement.

Once the basic steps in process improvement have been taken, the team should assess whether the potential improvement had the desired effect. If the improvement has worked, it will be evident in reduced process times. The cycle of process improvement is then repeated, as additional improvements are implemented.

The RAND Arroyo Center team, with the support of personnel and data from ATSC, began the process of defining the IMI development process and identifying the potential causes of the process delays described earlier. This initial investigation started by defining the steps in the process at the highest level and then mapping out the steps in more detail for critical segments of the process. This mapping was done both for the Army and for a generic commercial IMI development pro-

---

there are important differences in the number of iterations possible for improving logistics work (processes function daily and generate large amounts of performance data) compared to IMI development (currently annual cycle, few products).

Table 4.3
Major Steps in Continuous Process Improvement

Define the Process

- Lay out the process in detail, from "end to end," including all stakeholders, documents, decisions, and methods used to move information.
- Complete a "process walk" in which improvement team members "pin an order to their collar" and follow the entire flow of the process.
- Combine process steps into "segments" which should, if possible, be linked to individual organizations that "own" the segment.
- Establish metrics based on discrete time stamping.

Measure the Performance of the Process

- Use previously determined metrics to track performance of the process, including historical performance, if possible.
- Track the segment times in real time and make the results available to the process improvement team and other participants so they can provide feedback.
- Develop a baseline of performance against which to apply improvement efforts.

Improve the Process

- Propose changes in the process to reduce cycle time.
- Identify "low-hanging fruit" in the process, i.e., easy-to-implement changes that produce quick improvements, including
  - Eliminating unnecessary, non-value-adding steps.
  - Speeding up necessary steps.
  - Automating or eliminating explicit handoffs and approvals.
- Communicate improvements to segment owners and implementers, and establish ownership of the improvement effort.
- Provide performance data back to team and all stakeholders.

cess.[10] We based our mapping of the Army's IMI process on guidance in TRADOC Pamphlet 350-70-12, information and data from interviews with Army civilians at ATSC and interviews with training developers and instructors at the a number of the Army's proponent schools.

We divided the process into two major segments based on the date of "signing a contract." Contract signing marks the end of one set of activities (planning and preparation) and the beginning of another

[10] Based on interviews with commercial IMI developers and trainers.

(development). The planning and preparation segment encompasses all the activities from the time the school first perceives the need for an IMI course until the time when the contract is signed to develop the course. The development segment covers all activities from the signing of the contract until the point when actual Army learners are using the IMI content. The two major segments have been broken down further into many underlying steps, which involve many supporting documents and stakeholders.

Although many stakeholders might interact in the steps involved in a major process segment, the break points should be designed so that one main stakeholder is primarily accountable for the performance of all the steps in the segment. For example, for the period from contract signature and work commencement to Army learners actually using courseware, the segments and owners might be:

- **"Contract to First Lesson":** Main segment owner is the proponent school overseeing the IMI development and interacting closely with the contractor.
- **"First Lesson to Final Lesson Delivered":** Main segment owner is the proponent school overseeing the IMI development and interacting closely with the contractor.
- **"Final Lesson to Live":** Main segment owner is ATSC, which performs testing and implementation steps to get the content certified and running on Army servers.
- **"Live to In Use by Learners":** Main segment owner is the proponent school, which controls when and how the content is accessed by learners.

Make near-term improvements. Based on the interviews and data that were assembled to create the process map, we documented a number of important issues underlying the slow IMI development times. We also developed examples of a number of possible solutions to the issues via discussions with personnel from ATSC, staff at proponent schools, contractors, and commercial subject matter experts. These are not meant to be exhaustive, but instead represent the kinds of improvement actions that might be candidates for process improve-

ment efforts. We included in our list what we saw as "low-hanging fruit": actions that can be taken to address fairly obvious aspects of the process to produce significant changes early on.

Table 4.4 presents possible near-term improvement actions.

The simplest and most direct way to reduce end-to-end cycle time is to release IMI funds at the beginning of the year. The practice of not releasing DA-provided IMI development funds until near the end of the year increases cycle time substantially by delaying the start of needed courseware development. It also decreases the effectiveness of contractor selection and school-contractor interaction. While leading to the most immediate improvement, this option does require TRADOC command support.

Table 4.4
Recommended Near-Term Actions to Reduce IMI Process Development Time

Issues	Potential Solutions
Annual single "batch" cycle of a proposals slows process, as does the practice of year-end funding	Release IMI funds at the beginning of the year and initiate quarterly submissions and approvals of projects
Process complexity leads to delays: too many steps, documents, signoffs, changes	Continue to refine application of process improvement methods from "end to end," ensuring all elements of success are in place
Uniform length contract inappropriate for all size contracts	Tailor length to size of work effort for specific products
Funding surge for DL contracts at end of FY	Work with TRADOC to help leadership understand effects of funding strategy and change to distribute funds throughout year
Testing for full ALMS and SCORM compliance adds to fielding delays	Evaluate underlying causes of delays, review value of "blanket" requirement for all aspects of SCORM conformance, consider waivers for low reuse content
Best practices for speeding development are not widespread in the areas of local development and contractor relationship management practices	Create incentives and opportunities to share best practices via face-to-face and virtual meetings, e.g., • sessions at the spring DL meeting • improved web-based community of Army DL developers and contractors

Also of key importance among the suggestions in Table 4.4 is the recommendation to continue to implement and refine the application of process improvement methods, and to make them an ongoing part of TRADOC's approach to IMI development.

Begin improvements with longer-term payoffs. Longer-term solutions to address known issues that lengthen the IMI development cycle are listed in Table 4.5. Note that two of these solutions, changing the acquisition strategy and providing TADLP funds for assessment, are discussed earlier in this chapter.

Implementing the types of solutions to speed IMI development listed in Tables 4.4 and 4.5 is made easier in the context of what Hammer calls a "business process culture."[11] Such an organizational culture would mean that business units embrace a cross-functional approach to business processes. At the same time, all aspects of the

Table 4.5
Recommended Longer-Term Actions to Reduce IMI Process Development Time

Issues	Potential Solutions
Design, development, review, and revision of IMI content require a long time to carry out	Experiment with rapid development methods that use short, very focused sessions with SMEs and developers; use rapid prototyping methods to test user interfaces and content; use web-based collaboration tools for content reviews
Lack of resources at schools to provide appropriate project management, contractor relationship management, SME expertise	Provide funding to schools to increase expertise to oversee and speed IMI product development
Inflexible contract type that limits interaction, tailoring of content in timely manner	Change acquisition strategy: Move from "firm, fixed-price" to "requirements" contract type for software acquisition, maintenance
"Real" process improvement requires continuous cycles	Institutionalize practices, data collection/sharing, culture throughout TRADOC DL community

[11] Hammer and Champy (1993).

organization also take a "customer-oriented" view of how to provide the best service. For example, proponent schools are "customers" for TRADOC services, "Army learners" are the customers/consumers for IMI content, and unit commanders are the customers for trained soldiers. The intellectual foundation supporting the "business process culture" is the perspective of "process" or "systems thinking,"[12] in which the organization and customers are viewed as an interrelated set of entities with complex feedback and feed-forward loops.

Increase Local Participation in IMI Production and Contract Administration

To achieve multiple improvements in program outcomes, we recommend two ways that TADLP can increase proponent participation in IMI production. First, TADLP should increase the practice of producing some IMI in house. Proper selection of content for local production of IMI can reduce variable costs and cycle time and increase the responsiveness of IMI to the need for change. Second, in cases where IMI production is still contracted out, TADLP should decentralize selected aspects of contract management and administration in order to increase responsiveness and the quality of the IMI product.

Issues Regarding Local Participation in IMI Development

Early in the history of TADLP, IMI production was largely decentralized, with proponent schools producing nearly all the content in house. However, many believed this level of decentralization often led to unacceptable outcomes and practices, including the use of variable and often inefficient methods of production, and products of unacceptable quality. These outcomes were, in part, responsible for the transition of TADLP to a contractor-only production model, using a centralized contracting vehicle.

As shown by the assessment in Chapter Three, the contractor-only model of IMI production also does not fare well with respect

[12] Senge (1994).

to the DL measures of effectiveness identified in this report. Further, emerging technologies for IMI production have changed the dynamics involved in using in-house versus contracted staff.

In particular, a key enabling factor in the in-house approach is the greatly increased capability of authoring tools to produce and allow self-maintenance of web-based content.[13] These tools allow instructors to become developers of DL content without being web programmers.[14] Content can be up to interactivity Level 2 and occasionally even Level 3. This is accomplished by providing rich templates for navigation of web-based content, "drag and drop" programming of IMI features from libraries of generic objects (e.g., buttons), and "recording" of voice and interaction with software via capturing of all interactions on computer screens. Earlier efforts by TRADOC to standardize web-based authoring tools via "Toolbook" occurred when such tools were still early in their evolution and required significant programming skills. The newer tools, including Adobe "Captivate" and "Camtasia," allow SMEs with basic-level tool expertise to author Level 1–2 IMI.[15]

Recommendations for Improvement

In light of the greatly increased capability of authoring tools to produce and maintain web-based content, we recommend that TADLP expand the concept of in-house production. Recent Army efforts to bring more development in house (described in full in the following chapter) show that organic development can be achieved at only a fraction of the cost

---

[13] Brandon Hall Research Staff (2006).

[14] It is important to note that the evolution of powerful authoring tools is independent of the possible breadth of IMI instructional quality that is produced with those tools. High-quality IMI requires good instructional design and content, as well as effective delivery. Quality assurance will always be an issue.

[15] A similar phenomenon occurs for higher levels of interactivity (Levels 3 and 4) for some "soft skill" content (e.g., engaging in role-playing or problem solving). For example, basic simulations that use video vignettes with branching require only basic videography and simple video editing skills that are relatively easy to acquire. Achieving higher levels of interactivity for "hard skills" (e.g., simulating physical systems or creating virtual worlds where special relationships are important) continues to require greater levels of programming expertise.

of the Army's contracted DL rate and, equally important, in only a fraction of the time needed to develop comparable contracted courses. Further, in-house production is likely to lead to cost and time savings over the course lifecycle because maintenance and updating of the course can be completed locally. Perhaps most important, increasing in-house production allows local schools to be responsive to the ongoing need for courseware change, at a level that is comparable to that achieved with residential POIs.

Selected schools have already been resourced (outside of TADLP) for local production, and this practice should be substantially expanded. The benefits of organic development, however, can be accessible to the Army more broadly only with the provision of new processes and kinds of support, including sufficient manpower resources at the local level.[16] In the near term, embedding contractors might be more feasible than acquiring new Army civilians. As the number of projects increases, TRADOC may find it more efficient to turn increasingly toward DA civilian positions as the best way to develop most IMI content.

Even as schools begin producing their own IMI, DL contractors will still be required in many contexts. It is anticipated that in-house IMI production would be combined with contracting, in some cases to assist schools with some aspects of local production (e.g., complete the IMI with higher levels of interactivity), and in other cases to continue to produce entire modules (e.g., when the school has little experience with IMI or only a small amount of content to convert).

The acquisition strategy described in an earlier recommendation provided in this chapter can serve as an enabler for building in more local capability in the schoolhouse. The requirements contract is flexible enough to serve the Army during the transition toward more local production of IMI. For example, it would be straightforward to define

[16] Over time, this expansion will make it necessary to address some deficiencies related to training development capability that have emerged in the schools after years of capability cuts. For example, TRADOC will need to invest in the revitalization of curriculum development within schools, including those aspects related to learning analysis and course design, and will need to provide additional support for task selection with regard to the many evolving approaches to DL (these will be reviewed in Chapter Five).

varying scopes of work in requirements contracts based on individual schools' needs for contracting capability.

To maintain the integrity of TADLP contracting as a whole, the contracting process would still have centralized elements, even as the schools became more involved. For example, the Northern Region Contracting Center (NRCC) would continue to serve as the Procuring Contracting Office (PCO) for all TRADOC requirements contracts. Further, NRCC would establish common solicitation documents and uniform statements of work for all requirements contracts. However, contract management and administration could be appropriately decentralized in ways that facilitate more local participation in the IMI production process and higher-quality IMI content. The following changes are recommended.

Evaluation criteria. Although the NRCC would establish a common framework for proposal evaluation (including draft evaluation criteria), the proponent and local contracting office would have the ability to tailor technical evaluation criteria to make them specific to local needs. Technical criteria should emphasize the vendor's demonstrated expertise in the areas specified by the local contract and in the specific field of content. This would include the contractor's ability to keep SMEs on hand to help address the courseware content. It could also include evaluation of past performance on other contracts in such areas as quality, timeliness, and cost control.

Selection of contractors. In evaluating proposals, the local contracting office and proponent can also serve as the technical evaluation board, evaluating proposals in accordance with the criteria set by NRCC. This will establish local ownership of the contractor selection decision. The results of the technical evaluation board would be forwarded to NRCC as the source selection decision authority. NRCC, in concert with ATSC, would review the board's recommendation, select the contractor, and award the requirements contract.

Administration. Although NRCC would remain the procuring contracting office, administration of the contract could also be delegated to the local contracting office. Medical courseware, for example, could be administered by the contracting office at Fort Sam Houston. Army contracting officer duties could be fully delegated for each con-

tract to the appropriate local office. Alternatively, to retain configuration control, NRCC could grant the local office ordering authority for the local requirements contract, with the ability to generate work statements with the local school and issue the delivery orders.

Strengthen the IMI Quality Evaluation Component

Our fourth recommendation is that the Army strengthen program-level evaluation of IMI content produced by the schools. While the evaluation component for DL courseware has been delegated to the schools up to this point, we argue that instituting program-level quality evaluation would have multiple benefits and could be implemented cost-effectively.[17]

Issues Regarding the Evaluation of IMI Quality

Our baseline assessment concluded that there is no effective effort to assess course quality at the program level. Although several types of independent training evaluation occur at the proponent school level, TADLP does not have sufficient data and data integration to gauge overall program effectiveness (see Chapter Three).

Improved program-level assessment of IMI content may well be necessary to ensure content quality and IMI effectiveness in training. Our baseline assessment suggested a number of significant deficiencies in TADLP courseware produced to date (see Chapter Three). In particular, our evaluation of a sample of courses suggested that IMI content was somewhat "thin" in some areas, as exemplified by pedagogical shortcomings and the lower-than-required IMI "levels of interactivity" for much of the content. Such deficiencies may also have additional indirect effects on TADLP; for example, poor-quality courses could contribute to low usage rates of IMI modules.

Our pilot assessment might be considered preliminary in a number of ways. For example, we were able to assess only a small sample of courses produced in TADLP. Most of the courses were provided on

[17] Straus et al. (2009) is a more detailed treatment of this subject.

CD, which meant that we did not have access to fully functioning courseware or course tests. Furthermore, courseware being developed may not have the same deficiencies as the courseware reviewed in our analysis. Since the courseware production cycle is relatively long and our analysis reviewed only fielded courses, some of the courses in our sample were funded, and work begun, in FY 2005 or before. ATSC has continually added improvements to TADLP processes since that time.[18]

However, there are other indicators that the quality of DL content needs additional focus. Our study of the courseware development process found that originally intended content capability was sometimes sacrificed in order to accommodate other needed changes in the work without increasing the value of the contract. As we saw in the previous section, schools felt that insufficient resources were allocated to ensuring content effectiveness. More directly, our interviews with training development staff from proponent schools pointed to significant issues with the quality of the content produced under TADLP. In particular, over a third of the schools indicated they were "somewhat dissatisfied" or "very dissatisfied" with the DL content produced under TADLP.[19] Those dissatisfied with quality frequently commented that they saw inadequate quality-control processes within TADLP.

Program-level assessment of courseware quality is critical for strategic management for TADLP and will help in gaining support and resources from key stakeholders. A program-level assessment of IMI quality could aid in strategic planning and management: to understand TADLP outputs, to manage budgets devoted to increasing quality, and to identify and implement needed improvements to processes that affect quality. Moreover, ensuring and documenting the quality of IMI courseware is especially important to show the value of this

[18] For example, IMI levels have been better defined, and contractors currently consult with schools on the appropriate IMI levels for varying pieces of content. Moreover, ATSC has developed a series of checklists for schools that may have helped them improve processes related to IMI quality.

[19] The specific question was "How satisfied or dissatisfied are you with your school's current IMI development program with regard to the quality of DL products?" For a complete description of the school interviews, see Appendix A.

approach to instruction, to gain the buy-in of DL stakeholders. Given the recent sharp decline in the overall budget for TADLP, a clear record of success may be a prerequisite for securing the resources needed to achieve even a modest number of the program's goals.

Recommendations for Improvement

We recommend that a program-level evaluation of IMI content be established within TADLP. Such a program could be instituted in several stages, as described below.

Establish a program-level capability for content evaluation. We recommend that TRADOC establish the capability to undertake a more extensive content evaluation of at least a sample of TADLP lessons as they become available. As explained in Chapter Three, a content evaluation involves the assessment of training materials using external evaluators. Several criteria are recommended, including those listed in Table 4.6.

TRADOC could establish program-level content evaluation with relatively modest resources by using a sampling strategy (i.e., evaluate a sample of lessons rather than entire courses). Once criteria are developed and raters are trained, lessons can be evaluated with relative efficiency. A structured research effort like that undertaken in our project could be used to help determine the success of new initiatives aimed at improving quality and to guide the Army toward the most effective

Table 4.6
Criteria for Program-Level Training Content Evaluation

Technical	Production Quality	Pedagogical
• Launching • Navigation, tracking, and orientation • Supplementary instructional materials • Technical support	• Legibility of graphics and text • Audiovisuals	• Learning objectives • Sequencing, pacing, and learner control • Feedback • Instruction of concepts • Instruction of processes • Instruction of procedures • Checks on learning • Practical exercises

use of IMI for Army training by evaluating existing courses to identify ways to improve them. Moreover, this type of effort could support a move toward a "best value" approach to contractor selection, as recommended in the first section of this chapter.

The results of our pilot indicate that a content evaluation of courseware is feasible, can provide the Army with valuable information about courseware quality, and point to directions for needed quality improvements. The method we used has a variety of strengths. It provides a systematic method of evaluation using multiple raters and a comprehensive set of criteria based on standards proposed by experts in training development and assessment. Moreover, these criteria enable integration of results across courses, schools, or other units of analysis. Use of this approach to evaluation could be strengthened further; therefore, we recommend that the Army:

- Evaluate fully functional courseware rather than courseware provided on CD, and reassess and refine the criteria to reflect fully operational courseware.
- Where possible, establish objective standards for the criteria such as the degree to which lessons provide sufficient examples, checks on learning, and practical exercises.
- Establish weights for the criteria according to their relevance to course objectives and the resource implications of providing fixes for deficiencies.
- Evaluate online versions of courses in order to include an evaluation of additional features, such as course tests, bookmarks, and "live" technical support.

Establish a program-level capability for additional types of IMI quality assessments. A content evaluation covers some aspects of training quality, but a comprehensive assessment requires a multidimensional approach. In addition, a number of approaches to evaluating quality, discussed in Chapter Three of this report, can be facilitated by the use of information technology (IT). Table 4.7 lists some of the kinds of evaluations that could be performed by the Army.

Table 4.7
Types of IMI Evaluations That Might Be Performed by the Army

Type of Evaluation	What Could Be Done?
Learner reactions	• Develop core set of questions for trainees across IMI courses • Develop platform to enable schools to create/customize surveys • Create automatic scoring and reporting capabilities
Learning: pre/post comparisons	• Develop platform and automated scoring/reporting procedures to support analysis across courses
Learning: knowledge retention	• Administer follow-up tests to trainees
Performance (predictive validity)	• Assess strengths and weaknesses of AUTOGEN; explore facilitators and barriers to using it to collect performance data
Test evaluation	• Make item analysis of end-of-course tests an integral part of IMI via the LMS
Indirect metrics	• Expand and standardize RAND's initial analyses

A broad-based assessment might include the measures of student outcomes listed above, many of which could be tested on a pilot basis using a sample of IMI courses:

- **Learner reactions.** The Army might develop a core set of questions to administer to learners across IMI courses, develop an IT platform to enable schools to create/customize surveys, and create automatic scoring and reporting capabilities.
- **Learning (pre/post comparisons).** The Army could develop an IT platform to administer course pretests and posttests. Automatic scoring/reporting procedures could support systematic analysis of test scores across courses or schools.
- **Learning (knowledge retention).** The Army could administer and score follow-up tests relatively efficiently and inexpensively using IT. Such tests could be administered after learners return to their units or when they register for or attend the resident portion of a course after completing the DL phase.

A broad-based assessment might also include the other approaches listed in the table:

- **Performance (predictive validity).** IT could be used to collect and analyze data to assess the predictive validity of training, i.e., the association of individuals' performance in DL with performance in subsequent residential training or with ratings of subsequent job performance in the unit.
- **Test evaluation.** IT can be used to administer course tests and conduct statistical analysis of objective test items (i.e., multiple choice or true/false) to provide information such as whether items are at the appropriate level of difficulty and whether the tests discriminate among good and poor performers in the course.
- **Indirect metrics.** Automated systems can capture data such as enrollment and dropout rates, DL usage, and information pertaining to course development, such as cycle time. These types of indirect metrics can be indicators of course quality (e.g., DL usage might be low because courses are of low quality) and can also be used to help keep the program on track with regard to TADLP objectives.

Assessments should eventually extend beyond quality. In a broader context, evaluation of IMI quality should be part of a more comprehensive assessment component for TADLP. In addition to evaluating quality, that program would examine program impact benefits, efficiency, and cycle time issues. Additionally, assessment would involve not only where improvement is needed, but also an effort to determine underlying causes of unsatisfactory outcomes, and possible directions for improvement. Taken together, these efforts will give the Army a basis for managing continuous improvement in the development and use of IMI, and provide important tools to help meet the goals of TADLP.

Chapter Conclusions

The five recommendations described in this chapter are directed toward improvement in the IMI development program run by TRADOC in support of DL. Each of these measures is likely to have either direct or

indirect effects on the measures of effectiveness described in Chapter Three. Table 4.8 lists the five recommendations in the first column, then indicates for each measure of effectiveness whether the improvement would likely have a "direct" benefit or a "derivative" or indirect benefit.

Table 4.8
Likely Effect of Recommendations on Measures of Effectiveness

Recommendation	Program Impact	Efficiency	Quality	Cycle Time	Responsiveness
New acquisition strategy	Derivative	Direct	Direct	Direct	Direct
More resources per hour	Derivative	Derivative	Direct	Direct	Direct
Systematic process improvement of cycle time	Direct	Direct	Derivative	Direct	Direct
Increase local participation in IMI production	Derivative	Direct	Direct	Direct	Direct
Begin program-level quality evaluation	Derivative	Derivative	Direct	Derivative	Direct

CHAPTER FIVE

Transforming TADLP to Better Support Training and Leader Development Requirements

In the previous chapters of this report, we have presented the results of our examination of TADLP and, in particular, the Army's approach to IMI. This examination led to a discussion, in Chapter Four, of recommendations that can be implemented to improve the Army's existing approach to IMI. However, moving to the third purpose of the project and stage of the analysis (see Figure 1.2), the Army also needs to consider broader, strategic changes in its approach to DL. Such changes are necessitated by the increasing need for DL, in terms of the number of DL courses provided, the kinds of skills (e.g., complex thinking and problem solving) trained through DL, and the scheduling of institutional training to support unit readiness cycles.

This chapter addresses our first recommendation for broadening TADLP beyond a primary focus on IMI delivery. Specifically, it describes ongoing initiatives and other options to expand TADLP to meet the Army's future training needs. Options focus particularly on the development of a blended learning approach. Before describing these initiatives, we briefly make the case for transformational change to TADLP.

New Demands on Training and Leader Development Point to Need for Transformational Change

As discussed in Chapter One, developing and executing training programs has become an ever more challenging task, and the growing demands on training and leader development strategies in turn increase the demand on institutional training. There have also been pressures to reduce resident course length, and this generates a need for expanding TADLP.

Perhaps the largest challenge is posed by the need to prepare leaders for a greater range of possible operational missions, or full-spectrum operations, while simultaneously supporting a demanding set of ongoing operations. This challenge is made more difficult because the training system is already struggling to cope with several other new demands: modularity and modernization.[1] These changes have meant that the Army needs to prepare soldiers and leaders to take on a range of increased and continually changing requirements. The need for enhanced leader development is especially important.

At the same time, ARFORGEN, the Army's cyclical process for preparing and providing forces for deployment, requires Army units to move through a structured set of collective training exercises over a specified training cycle, ideally set at three years for the AC, but shorter in current practice. ARFORGEN puts great demands on the scheduling of institutional courses and limits the length of time soldiers can spend at a schoolhouse away from home station.

As an example in terms of NCOES, the impact of ongoing operations has been especially significant. Large numbers of NCOs simply have not been able to go to the courses developed to prepare them for their duty positions. As of August 2008, about 50,000 NCOs, a quarter of the Army's NCO population, were in such a backlog status.[2] For example, about 19,600 AC staff sergeants (out of a population of just over 64,400) had not completed BNCOC.

---

[1] These concepts are discussed in more detail in Chapter One.

[2] Data obtained from the DA G-1 staff in September 2008.

Additionally many NCOs are assigned to positions authorized to be filled by a higher grade (e.g., sergeants being assigned to a staff sergeant position) and would normally not have attended the course required for the higher grade.[3] Thus, it seems likely that a third to half of today's NCOs have not attended the courses designed to give them the skills and training to serve in their current duty positions. Given the expectations of continued but reduced operational demands, even if deployments can be reduced to one year out of three, getting NCOs to readiness-required courses is likely to remain a challenge.

The needs and requirements just described have led the Army to place increased emphasis on DL. For example, the draft Army Campaign Plan outlines a major role for TADLP in supporting a lifelong-learning construct. In particular, the Army has been aiming to leverage the potential of DL to cover newly required skills and tasks, envisioning a major role for DL in transforming its training and leader development programs.

But the budgets to support DL initiatives have been limited and, as we have shown earlier in this report, are decreasing. Further, the amount of training courseware and the training benefit from the DL courseware that has been produced and kept in use have been modest and focused on the RC. So while the DL program has been helpful, it has provided only limited increases in the amount of training and leader development accomplished.[4] Clearly, if the heightened roles envisioned for TADLP are to be achieved, major program improvement is needed.

Better leveraging DL could conceivably provide many benefits. First, this approach could facilitate scheduling training to fit unit windows, thereby benefiting unit readiness, because more leaders would enter collective training with better preparation. Second, the approach

---

[3] This is based on ongoing RAND research that examined the grade of NCOs assigned for unit positions during preparation training events for deployment. Results of the analysis showed that mismatches were frequent. For example, almost a quarter of the squad and section leader positions were filled by NCOs of a lower grade than the authorized level of staff sergeant.

[4] Based on an ongoing RAND Arroyo Center examination of DL courses and graduates across the last several years.

also has the potential to reduce costs by eliminating the need to send soldiers to resident courses.

Blended Learning Options Have the Potential to Significantly Expand DL's Role

The Army's Approach to DL Has Limitations

Up through the time of our assessment, the Army has used what might be called a "stand-alone" IMI model as its dominant approach to DL. Under this model, contractors are used to develop 40+ hour chunks of custom IMI content that is designed to require little or no instructor or other support during delivery.

This approach, by itself, has turned out to be severely limited in its ability to fulfill the Army's expanded need for timely and exportable training. First, as described in Chapter Three, the courseware development takes too long to meet many of today's needs. Further, given the Army's decreasing budget for courseware and the relatively small throughput for many courses, the Army's estimated average rate of $14,000 per training hour for DL conversion implies that relatively few courses will be converted and that payback periods for the initial investment will be long. Finally, although the new proposed acquisition strategy for IMI has potential to increase the responsiveness of courseware to needed changes, the time required to implement changes to a DL course would still be far longer than the time needed to alter a course that is exported by other means (e.g., a mobile training team (MTT) or VTT).

The stand-alone IMI model is also limited in other ways in its ability to meet all the Army's DL needs. For example, stand-alone, self-paced IMI can be used cost-effectively only to provide lower levels of learning (i.e., knowledge, comprehension),[5] as opposed to the higher levels of learning (i.e., analysis, synthesis, and evaluation) needed for most leader tasks. Put another way, stand-alone IMI can often teach

[5] Bloom (1964); see also a summary at http://www.nwlink.com/~donclark/hrd/bloom.html.

enabling learning objectives (ELOs) from a course, but not often the terminal learning objectives (TLOs). For example, while IMI can be used to teach knowledge of the tactics involved in a platoon attack, it cannot exercise or test a student's ability to develop an actual attack plan without the development of complex, expensive courseware. As a result, the Army's dominant model of DL delivery is limited from the start, since few terminal learning objectives or tasks can truly be trained to standard using just stand-alone IMI.

The Army's *implementation* of IMI training is also limited. For example, in the Army's phased approach to DL (where DL is preceded by a residential phase), there is often an extended period between learning the ELOs through IMI and completing the TLOs in the residential part of a phased course, thus making the potential for learning decay an important factor. Most of the advantages of having an IMI preparatory phase disappear entirely if instructors have to review in residence the material taught in the IMI. Also, the relatively long IMI courses combined with the lack of regular instructor contact likely mean that the completion rate for DL courses will lag considerably behind what is achieved in other courses.

As a result, the Army's IMI stand-alone model, even with implementation of the improvements in IMI development described in Chapter Four, is unlikely to satisfy the Army's large need for expanded exportable training in NCOES and other key readiness-enabling courses required during the Reset phase of the ARFORGEN cycle.

Additional Options Expand the Range of DL Benefits

To meet increasing demands for DL, the Army will need to expand its traditional approach to developing and delivering DL. Below we describe the Army's approach compared to six other options for DL. We highlight and compare some of the salient advantages and disadvantages of each approach.

IMI Levels 1–3, Stand Alone. The Army's approach of using stand-alone IMI with interactivity Levels 1–3 has the benefit of providing scheduling flexibility to the student, who can access the course 24 hours a day, 7 days per week. Further, because the instruction is

embedded in the technology, limited interaction or collaboration with instructors is needed.

However, for the same reasons, the method also requires a significant number of training-development hours to produce. The training-development time required to produce one course hour of IMI content (mix of Levels 1–3) is estimated to be about 220 hours.[6] As described above, there are major disadvantages to this approach, most notably that instruction can cost-effectively be used to provide only knowledge and comprehension (and sometimes application) levels of learning, not the higher levels of analysis, synthesis, and evaluation.[7] As a result, other modalities of learning would be required for students to reach terminal learning objectives on most key tasks in leader courses.

IMI Levels 1–3, Instructor Supported. This approach similarly depends on IMI technology to deliver the content, but also makes human instructors available to monitor and support learner progress, respond to student questions about content, and provide feedback on tests. This capability must be supported through communication and collaboration technologies (described below) and is not generally feasible unless the student is taking the learning online. Depending on the level of instructor support, this approach often provides less flexibility to the learner than other DL approaches do because student-to-instructor communication is usually asynchronous and requires waiting for a response (e.g., a course may be designed so that instructors respond to learners within 24 hours of a question or request).

However, this method can support somewhat higher levels of learning compared to stand-alone IMI Levels 1–3 because of the added instructional support. In particular, instructors end up providing motivation as well as diagnostic and prescriptive instruction to help individuals understand concepts and acquire skills. Finally, because of the instructor role in providing the training, the IMI itself can be more basic (e.g., involve less interactivity) and less comprehensive in some areas compared to what is required for stand-alone IMI, allowing for

---

[6] Chapman et al., (2006b). This estimate also corresponds fairly closely to TRADOC estimates.

[7] Shanley et al. (2007), p. 190.

a somewhat reduced training development effort up front to create content.[8]

IMI Level 4, Asynchronous. IMI Level 4 usually consists of simulations or "serious games" to provide learners with an immersive experience at high levels of interactivity in the learning domain to facilitate TLO-level training. This approach typically provides the same flexibility of access as found in any level of IMI, while allowing the teaching of richer knowledges and experiences than found at lower interactivity levels. Highly interactive experiences can be used as a motivating and orienting tool and can also provide for introduction of more complex content.

However, achieving this level of interactivity often requires significantly higher levels of training development investment per hour of content compared to lower levels of interactivity or instructor-led training.[9] Moreover, while this approach is potentially effective for increasing some skill levels, it would likely have too high a development cost (in terms of both SME and technical expertise) to stand alone in providing positive "training transfer"[10] on most tasks. Further, this approach is usually appropriate only for a very limited part of most programs of instruction.

IMI Level 4, Synchronous. This approach usually means synchronous simulations and serious games involving multisided interactions with two or more players on opposing sides, or involving multiple role players, as well as an instructor to oversee and facilitate an end of exercise After-Action Review (AAR). This technology is offered mainly as a component of resident training, but the capability for online virtual

---

[8] In fact, the content can sometimes be reduced to PowerPoint slides with voice narration. Studies have shown (see Chapman reference above) that this approach to IMI requires no more training development effort than instructor-led training.

[9] One estimate is that it takes 750 hours of simulation development time to create an hour of training, compared with 34 hours of development time to create an hour of instructor-led training and 220 to create an hour of IMI, Levels 1–3. See B. Chapman et al., *Online Simulations: A Knowledgebase of 100+ Simulation Development Tools and Services,* Sunnyvale, Calif.: Brandon Hall Research, 2006a.

[10] To achieve positive training transfer, the training has to provide exercises that teach the appropriate actions in a real-world activity.

application has been available for many years and is undergoing great growth in both the commercial and military sectors. There is a great potential application for this type of technology to provide for instruction of more complex content at higher levels of instruction, such as aspects of analysis, synthesis, and evaluation. Further, it offers a flexible means to change scenarios and does not place significant demands on artificial intelligence capabilities to provide for realistic outcomes. A disadvantage of this approach is that it requires significant investment in training development resources (although less than for asynchronous Level 4 IMI, given that less artificial intelligence for player actions is required). Another disadvantage is that it requires significant effort for scheduling and coordination.

Asynchronous Collaborative DL. This approach uses technology to enable communication between student and instructor and among students via such avenues as email, forums, discussion boards, telephones, or wikis. It involves considerably more interaction than the instructor-supported IMI described above. No matter which method is used, the instruction comes from the instructor, while the role of technology is one of facilitation. Since the primary support for the instruction is provided by the human instructor, this approach to DL can be used to teach all levels of knowledge. For example, under this approach the student could be required to write an attack order, submit it to the instructor for review, and than receive detailed feedback. This approach can also provide for student-to-student as well as student-to-instructor interaction, and according to some developers we interviewed, the levels of interaction can be higher than in traditional classroom approaches. As with asynchronous instruction in the IMI context (explained above), the flexibility of asynchronous collaborative DL is moderate—the learners typically have delayed access to the instructor and fellow students. Training development costs are often relatively low because basic types of IMI can often be used for support, but instructor support is often substantial, sometimes at the same level as provided in residential instruction.

Use of this method depends on collaborative technologies to enable the interactions and exchange of documents, and may require some training so that participants have sufficient command of those

technologies. There are also often requirements for common features of learning management systems,[11] such as online posting of assignments, online grade books, time-stamped submission of assignments, and online quizzes and tests.

Synchronous Collaborative DL. This approach involves real-time interaction between students and instructors. Like instructor-centric asynchronous collaborative DL, this method requires the instructor to carry the weight of the instructional delivery, and it can be used to teach all levels of knowledge. However, having students and instructor online at the same time can greatly increase the difficulties involved in scheduling and coordination. Training development costs are comparable to those needed for residential training, but travel costs are obviously reduced greatly. Delivery costs will depend on the level of dispersion among learners and the need for down-site instructors or coordinators. It would also require either compatible facilities, or provision of appropriate technology to students.

Web-based synchronous and collaborative DL requires its own set of technologies to enable delivery. Commercial tools are available to provide many of the features common to this approach:[12]

- Many simultaneous participants in a web-based "classroom."
- Instructor's ability to:
  - Broadcast voice or video to participants.
  - Work through briefing slides, demonstrate software applications running locally on a computer or on the web, show videos.
  - Patch in live video streams from other locations.
  - Take questions (via voice, chat, or other method of submission).
  - Provide voice communication by individual participants to all participants to share an insight or question.
- Participants' ability to:
  - Take control of applications or collaboration skills.
  - Pose questions to the instructor.
  - Chat with each other.

---

[11] Rossett (2002).

[12] Woodhill (2007).

Some collaborative learning tools also allow the instructor to record the entire live session into a digital movie format that can later be used to provide an asynchronous learning experience. All voice interactions, images that appear on the screen, participant questions, and other interactions are part of that recorded session.

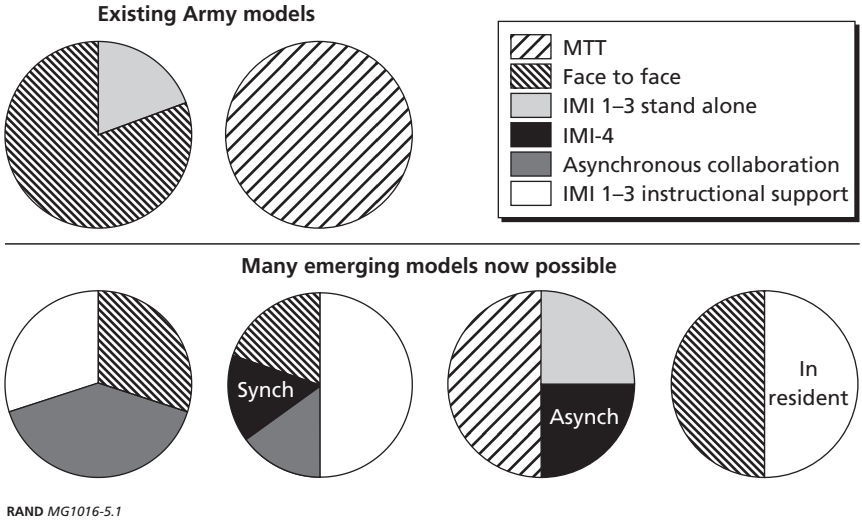
Mobile Training Teams. MTTs provide instruction to learners at the learners' location rather than at the schoolhouse. Variations on this approach include the use of local schools at learners' home stations or instruction conducted by unit leaders with the support of institutional resources (e.g., training support packages or TSPs).

Though technically not classified as a DL approach to instruction, the use of MTTs is an important method of exporting training that the Army employs. Its primary advantage over other instructor-supported methods is that it provides the opportunity for hands-on instruction and practical exercises in the field or on equipment that is not possible with other methods. Further, this approach, without using technology, is often faster and more effective at instruction at higher learning levels than other technology-intensive learning methods. The primary limitation of this method is that it is practical only when there is a sufficient number of learners concentrated in one location.

Many Organizations Mix DL Approaches Within a Course to Form Blended Learning Options

Many organizations using DL are moving toward employing a mix of approaches within a single course. This new type of course is constructed by considering all potential modalities for delivering training on a task-by-task basis, leading to a distribution of different modalities across the entire course. Examples of possible combinations of DL modalities are shown in Figure 5.1. As implied by the previous discussion and the top part of the figure, the Army has traditionally made use of only a small number of the possibilities within a course, for example, using stand-alone IMI to take the place of an average of 60 hours of instruction in a much longer course. VTT and MTTs have also been used. In contrast, many organizations needing to export training are making choices that involve a more complex combination of the avail-

Figure 5.1
Current and Future Possible Combinations of DL and Other Training Approaches



able options, leading to the creation of blended learning courses. These are portrayed by the examples in the bottom part of the figure.[13]

Making decisions about which modalities best train individual objectives is a difficult undertaking. The general considerations described in the previous subsection regarding the varying capabilities, constraints, and resource requirements of DL approaches provide a host of factors that need to be taken into account in specific instances. Important factors include the following:

- Expected usage rates of the training content.
- Deadline for delivering the DL.
- Speed with which TLO can be achieved (if the DL only addresses ELOs).
- Stability of the training content.
- Degree of dispersion of learners requiring the training.

[13] For examples, see Chapman (2008).

- Need for student-to-instructor and student-to-student interaction.
- Supply of instructors with the required experience.
- Need for equipment or training aids.

Moreover, decisionmaking is made more difficult by the rapid increase in the capabilities of collaborative tools for enabling DL instruction. The Army has no effective guidance and few tools or processes to help determine the best mix of approaches to maximize the effectiveness of its modest budget for courseware. Data from the commercial and academic sectors indicate that determining the best mix is becoming more complicated and varies by subject matter and industry.[14]

Award-Winning Commercial Companies Have Dramatically Increased the Exportability of Leadership Training Using Blended Learning Models

In Figure 5.2 we provide an example from the commercial sector of how training can be successfully exported. The example illustrates IBM's blended learning program,[15] which earned the company the "Technology in Action" award from *Training* magazine and caused the company to be recognized as a "training Top 100 company" for over five years.[16]

IBM is the world's largest information and technology company, with over 300,000 employees in 75 countries. The company's training focuses on leadership and management as well as technical skills, and involves the creation of global virtual teams. The training often deals with complex issues, e.g., issues of re-skilling the workforce to address key market shifts and organizational transformations. On average, employees average 55 hours of training a year. As in the Army, IBM personnel have decreasing amounts of time available for training and formal training budgets are limited. IBM needed a capability that would allow employees to learn anywhere, anytime, and on demand.

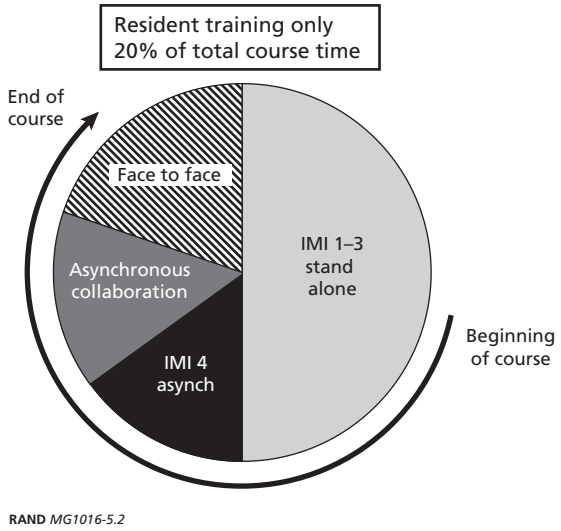
---

[14] Wexler (2008).

[15] Chapman (2008) and "IBM's Learning Transformation Story" (2004).

[16] *Training* determines the award winner in a multitiered nomination, application, and interview process. IBM has been among the top five candidates for five years running.

Figure 5.2
IBM's Blend of Learning Approaches Minimizes Resident Contact Hours



RAND *MG1016-5.2*

IBM transformed its formal learning program by moving from a model based primarily on classroom training to a blended learning model that optimizes a combination of DL approaches to export as much of the training as possible. IBM settled on using the following mix of learning modalities to achieve their optimal combination.

- **Web-based IMI, supported by an instructor.** Used to instill facts, figures, and other knowledge about the subject, as well as comprehension of concepts and procedures. Training content can include documents as well as basic distributed learning instruction. This approach accounted for 50 percent of training hours.
- **Asynchronous simulation and games.** Used to provide immersive experience and allow role-playing for problem solving. This approach was not designed to reach terminal learning objectives, but instead was to motivate and familiarize learners with the contexts within which they will apply the information they are learning. This approach accounted for 15 percent of training hours.

- **Collaborative, asynchronous and synchronous.** Includes use of virtual classrooms, e-labs, online conferences, and other technologies to team students up for group projects and provide for student-to-student as well as student-to-instructor interactions. This approach accounted for 15 percent of training hours.
- **Face to face.** Classroom session designed to synthesize the lessons learned from the other three delivery methods. No longer lecture-based, these approaches typically involve interactive learning on the complex areas (e.g., through practical exercises, discussion of case studies and scenarios) with direct coaching and mentoring from an instructor. This approach is also used for testing to ensure that terminal learning objectives were met. Such face-to-face activities accounted for 20 percent of the training hours for the course.

These four steps are somewhat analogous to the steps used to train military and commercial pilots. First, analogous to the use of web-based IMI, pilots attend ground school to learn facts and concepts to acquire knowledge and comprehension levels of learning. Second, analogous to the use of simulations to provide immersion and feedback, pilots learn to apply concepts with the help of a computer-based simulation. Next they perform training on an expensive, highly realistic simulator that almost fully replicates the task of flying an aircraft and gives the student the opportunity to get full performance feedback from the simulator and an instructor.[17] Finally, pilots fly with the help of an instructor, so that students can be tested and practice applications on actual equipment and in a fully realistic environment.

Through the training approach just described, IBM has been able to reduce the residential component of key leadership courses to only 20 percent of the total. Further, because the company was not so dependent on classrooms and travel, it was able to dramatically increase the amount of training provided without significant increases in cost.

[17] In some respects, this is more realistic and important than live training, because students can practice to cope with dangerous emergency situations that would not be possible to practice in a live environment.

The discussion of a commercial example in itself, even a successful case such as that of IBM, might still be of limited value to the Army, given the issues involved in translating an approach from a commercial to an Army context. However, as will be seen in the next subsection, we found similar concepts at work inside the Army.

Emerging DL Courses in the Army Also Show a Move Toward Blended Learning and Promising Benefits

A few courses in the Army (although outside of TADLP) are also beginning to use blended development and delivery methods in an effort to meet more of the Army's needs for DL more cost-effectively. We will consider two cases within NCOES: the pilot BNCOC (now ALC) Common Core (CC) course developed by TRADOC with the support of the U.S. Army Sergeants Major Academy, and the Special Forces (SF) ANCOC (now SLC) course developed by the NCO Academy at the U.S. Army Special Warfare Center and School.

Experience from these courses suggests that the Army can effectively use multiple modes of DL and resident training modalities to train complex tasks and can convert a greater percentage of course content to DL than is currently achieved while, in the process, significantly reducing the time required in residence courses. Moreover, this progress toward Army training goals in NCOES shows what can be achieved by a blended approach while reducing development costs and the traditional inflexibility of IMI course content to change.

BNCOC Common Core. The approximately two-week BNCOC Common Core course has traditionally been available on a residential basis, via VTT, or via MTT. Even though two of these options are exported training, the choices were considered inadequate because they failed to provide a flexible enough learning environment to meet soldiers' and commanders' needs.

The new version of the BNCOC Common Core will use asynchronous DL methods to create a more flexible learning environment in which students can take a course anywhere and anytime over a 90-day period. Self-paced IMI, the dominant Army choice in TADLP, is one of the asynchronous DL elements used, but it is employed continually throughout the course rather than in the traditional phased approach

that puts all the IMI up front. Further, collaborative methods are used to create a virtual small-group process and to allow higher levels of learning in the DL portion than is possible with IMI alone.

The classes are divided into learning modules, each containing one or more classes and several lessons. Each class contains some IMI (e.g., lectures with slides, videos) aimed at providing basic knowledge and completing ELOs. TLOs are achieved through online discussion boards that create an environment much like the small-group environment in residential training. Both student-to-student and student-to-instructor interaction and collaboration occur within the process. The discussion typically begins with a question from the instructor. Each learner is then assigned to post a 250-word answer to the discussion question. In addition, the learner must post two replies to their classmates' responses, or post a response to the instructor's follow-on questions. Instructors interact with the students by providing feedback and comments on practical exercises to ensure that the students understand clearly and are able to apply the materials within the lessons.

The new BNCOC Common Core course was in a pilot stage awaiting validation at the end of this study, and thus its success as a DL approach had not been established. Further, even if shown to be successful, there is a question about whether the design of the course will be easily transferable to other NCO courses, since by definition the course is a phase of a larger BNCOC (now ALC) course that covers learning objectives more specific to particular occupations. While the entire Common Core course is exported, it is not clear to what extent the technical, and often more complex and equipment oriented, aspects of the second (MOS-specific) phase of the course could be exported. However, it seems quite likely that much of the instruction that is done in a classroom-only mode could be converted (e.g., if the TLO is to be able to write or present an operations order).

Special Forces ANCOC. Broader and already tested results for NCO courses are available in the Special Forces (SF) ANCOC (now SLC). The general approach used in the BNCOC Common Core was borrowed from the approach already successfully employed in SF ANCOC. That course began as a 7.5-week residential course that included both common and occupation-specific elements, and it has

been converted, validated, and successfully used for over a year in its DL form.[18] The course intersperses IMI and collaborative methods in much the same way as the BNCOC Common Core course, but also has a residential phase. However, the SF NCO Academy has been able to reduce the residential portion of the course to 3 weeks, thus achieving a more than 60 percent reduction of the course's original length of 7.5 weeks. The exportable DL portion of the course (nearly two-thirds) constitutes a much greater percentage than the 15–20 percent DL achieved by existing efforts.[19] In addition, since the course is less dependent on residential training, it is able to offer more start times per year, thus allowing more learners to get through the program and reducing the backlog of learners awaiting the course.

These new methods might potentially have other advantages, but further study is needed. For example, instructor support for the new DL strategy will clearly be greater than with the stand-alone DL method, but it could well turn out to be less than that required for residential and VTT training methods. In the SF ANCOC course, school personnel estimated that the same instructor core is needed to support the DL course as to support all residential courses, but that instructor core can also accommodate DL development needs without additional resources. These factors will have to be verified with testing.

In-House IMI Production Can Effectively Support Blended Learning Courses

The IMI development methods used in the BNCOC and ANCOC blended learning courses described above used instructors rather than contractors to produce the content. There have been several advantages

[18] Although the analysis is not formally documented, the NCO Academy has determined that the course is successful at training the required skills to an equal or greater standard than the residential course. One advantage of the virtual small-group process is that all students participate equally, as opposed to the typical classroom situation, where there is high variability in how much individual students participate.

[19] If a BNCOC or ANCOC course is 8 weeks long, and 60 hours is converted to DL via funded IMI modules, the DL portion would be less than 20 percent (1.5/8).

to this approach. First, IMI development was responsively integrated into the total course execution plan. TADLP contracting methods had at first been utilized to produce the BNCOC Common Core course, but the courseware development process took so long that by the time it was complete, the courseware was obsolete. As a result of this experience with TADLP processes, and the contrasting success of the SF ANCOC's internally developed IMI, the BNCOC course developers decided to do the IMI development in house.

Second, organic development cost was found to be only a fraction of the comparable contracted course. In the case of the BNCOC Common Core, the cost amounted to about $70,000 to purchase the authoring tool and pay TDY costs to instructor/developers. While the level of effort needed to complete the development was not recorded, the NCO Academy estimates it to be more than a year of effort but substantially less than two years. Thus, total costs (including the value of the developer's time) were likely somewhere around $200,000, compared to a contracted cost that would have ranged somewhere between $500,000 and $1 million.

Another significant advantage of the internally developed content is that maintenance and updating of the course can also be completed locally, and as often and as soon as the school thinks the changes are needed. The ability to make changes allows the instructional departments of the school to take full ownership of the course.

Chapter Conclusions

The need to accommodate full-spectrum operations, modularity, and modernization has greatly increased the Army's training and leader development requirements. Moreover, higher operational deployment rates, which are expected to continue for the foreseeable future, have narrowed the windows when institutional training of unit leaders and soldiers can be conducted.

As a result, the Army is making major changes to training and leader development strategies, especially in its concepts for delivering

institutional training. A greatly expanded role for exported DL is a key element in these emerging concepts.

Major changes in the Army approach to DL can lead to significant benefits for the Army and better meet emerging strategic objectives. Emerging experience suggests that the Army can cost-effectively achieve significantly greater exportability in DL content and greatly increase the potential of DL to meet expanded training requirements. While these results are encouraging, they will need to be verified through ongoing validations and further tests.

To summarize, we recommend:

- Renewed focus and command emphasis on exportable DL for leader development using blended learning models.

We have concluded that such change can lead to the following benefits:

- Ability to significantly reduce the need for resident instruction.
- Better support of unit readiness, especially for units entering the Train phase of the ARFORGEN cycle.
- Increased ability to train critical tasks and skills.
- Reduced development costs and a greater return on investment.
- Expanded responsiveness of DL to increasing demands for change.
- Increase in the quality of DL content.
- Greater school buy-in to DL concept.

CHAPTER SIX

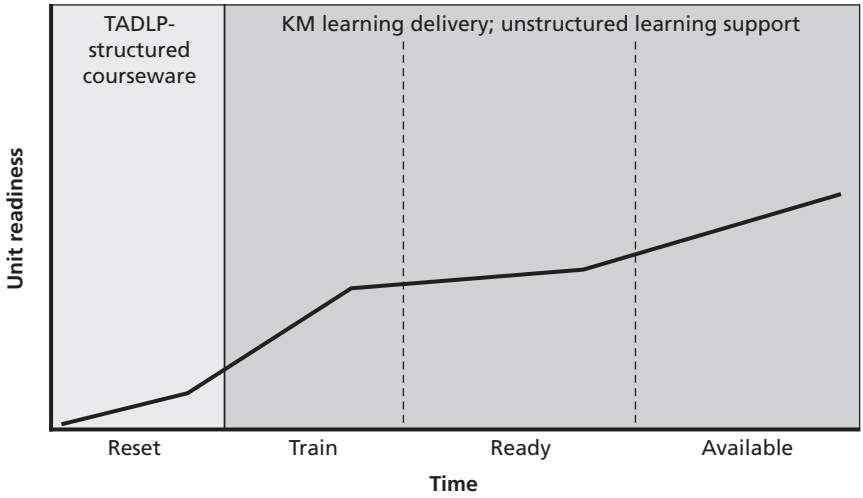
Integration of TADLP and Knowledge Management Learning Delivery

The previous chapter discussed the first major direction for broadening the TADLP beyond its current focus on stand-alone IMI. In this chapter we focus on a second major direction, integration of TADLP and knowledge management (KM) learning delivery. We argue that the Army should integrate KM learning delivery into the Army's DL effort in order to provide a more comprehensive and integrated DL capability.

We focus on the function of KM support of soldier and leader learning in operational units and call this function "KM learning delivery," which we define as "the web-based support of individual soldier and leader learning that takes place outside the framework of formal school courses." We developed this definition to cover a function we consider to be an inherent part of the overall goals of a DL program (provide learning anywhere, anytime), but not currently under TADLP, which focuses on IMI support of TRADOC structured courses.

The relationship between TADLP and KM learning delivery is shown in Figure 6.1, which illustrates how the two connect with the ARFORGEN cycle. TADLP is aimed more at supporting structured courses that occur during the Reset phase, while KM learning delivery programs provide support through all ARFORGEN phases. The two programs should be integrated in a way that provides the Army with a full DL capability to support both structured and unstructured learning.

Figure 6.1
How TADLP and KM Learning Delivery Complement Unit Readiness



RAND *MG1016-6.1*

This chapter begins with a description of the KM program and its objectives and then discusses KM learning delivery programs. We then examine the benefits of KM learning delivery programs to operational forces. We conclude the chapter by considering ways in which TADLP and KM learning delivery programs could be better integrated.

The Knowledge Management Program and Its Objectives

Although we focus our examination on the distributed delivery and creation of knowledge in Army soldiers and leaders, the term KM refers to a far wider range of functions and activities.[1] The Army defines KM as "the art of creating, organizing, applying, and transferring knowledge

[1] The examination of KM and KM learning delivery presented in this chapter was completed at the end of FY 2008. Since that date, there have been some program changes and in some cases enhancements or increased emphasis. However, a recent review showed that the basic findings, conclusions, and directions presented in this chapter remain valid.

to facilitate situational understanding and decision-making. Knowledge management supports improving organizational learning, innovation, and performance."[2]

Expected Broad Benefits from KM

AR 25-1, *Army Knowledge Management and Information Technology*, outlines ambitious KM goals: facilitating changes in governance and culture to transform to a knowledge-based organization; integrating best business practices into Army processes to promote a knowledge-based force; and leveraging the information structure as an enterprise to enhance capabilities and efficiencies so warfighters and business stewards can act quickly and decisively.[3] The Army KM strategy is designed to connect people, knowledge, and technologies to achieve these goals; accordingly, the term KM applies to the support of a wide range of activities.

Operational KM

The Army's doctrine and modernization efforts emphasize the use of KM to support the achievement of situational awareness and understanding to gain a major operational advantage. Operational KM provides a means for soldiers to take advantage of favorable operational circumstances and to facilitate coordinated and rapid action. To facilitate effective operational KM, the Army is making major investments in C4ISR systems and is augmenting unit authorizations to form KM cells in operational units.[4] From this perspective, KM represents a training requirement, as the Army must establish training programs to teach its soldiers, leaders, and organizations to accomplish KM tasks and possess KM skills, and this will not be a simple objective to reach.

KM Support of Training and Leader Development

The Army is also anticipating broad use of KM to transform its unit, individual, and leader training and to align with DoD's Training

---

2 FM 3-0, *Operations,* February 2008.

3 AR 25-1, July 2005.

4 FM (Interim) 6-0-1, *Knowledge Management Cell,* October 2007.

Transformation initiatives.[5] The use of KM to support training is wide ranging and includes:

- Management and execution of training and leader development programs in the operational, institutional, and self-development domains.
- Collaborative development of knowledge (e.g., doctrine; tactics, techniques, and procedures (DTTPs)) to tie together the efforts of the soldiers and leaders in institutional organizations and operational force.
- Delivery of training and learning products to support individual and collective training and individual and leader learning in operational forces.

For this study we will focus on this last function, but we want to highlight the importance of the knowledge development function. The key benefit of any KM system is its ability to foster and deliver relevant and readily applicable knowledge. Due to the rapidly changing nature of today's full-spectrum operations, the Army faces a significant challenge in developing a complete, current, and valid knowledge base of doctrine, tactics, techniques, and procedures. From a training and educational perspective, the KM goal of facilitating collaborative development of operationally important knowledge is fundamentally important, not only for TADLP, but also for broader training and leader development program goals.

Need for Substantial Improvement in KM Programs

While the Army's broad KM goals were established almost five years ago, the degree of change needed to achieve them is large. Not surprisingly, given the complexity of the processes it will support, the effort is very much in preliminary stages.

---

[5] Secretary of the Army/CSA Memorandum (2004). See also Department of Defense, *Strategic Plan for Transforming DoD Training, F*ebruary 2009.

KM Learning Delivery Programs

The Army's training vision includes the establishment of an enhanced capability to "develop and distribute knowledge via a dynamic, global knowledge network called the Battle Command Knowledge System with a purpose of providing immediate access to joint and service training and leader development resources."[6]

As a result of this direction, TRADOC's commanding general established a Battle Command Knowledge System (BCKS) organization to develop an Army-level KM system to support soldiers and leaders in the performance of their operational missions. This organization is under the Combined Arms Center (CAC) Commander at Fort Leavenworth, Kansas, and includes the U.S. Army Forces Command's (FORSCOM) Warfighters' Forums (WfFs).[7]

Three other key Army programs directly support KM learning delivery goals: the Center for Army Lessons Learned (CALL) and two doctrinal repositories on the Army Knowledge Online (AKO) system: the Reimer Digital Library (RDL) and "Army Pubs and Forms" or E-Pubs. Access to all three of these programs is available through AKO, although access to some sites or knowledge objects requires special authorization.

Figure 6.2 illustrates the way in which the institutional Army uses these programs, not only to support learning in the operational force, but also to support its own doctrinal and training content development capability.

These programs serve many functions:

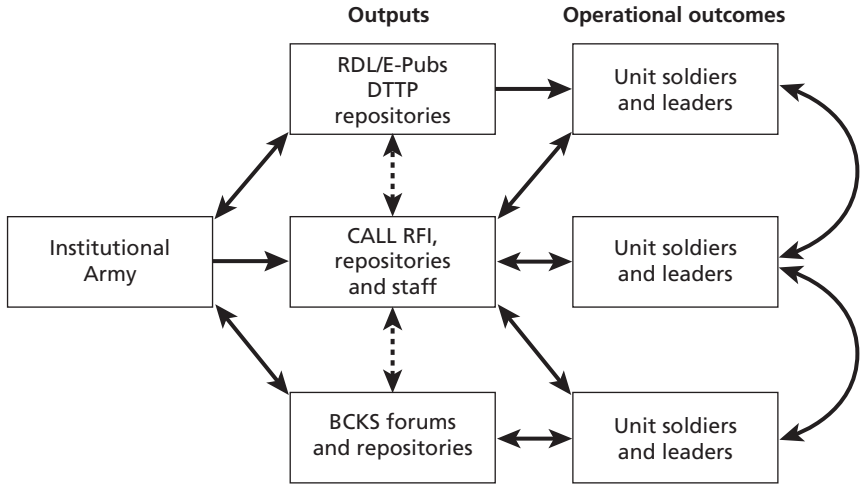
- BCKS provides community forums for discussion and development of tacit knowledge among operational force soldiers and leaders.

---

6 Secretary of the Army/CSA Memorandum (2004).

7 The BCKS charter was to provide technical and contract support to assist the stand up of KM forums. Once a forum reached an initial operational capability, the management and sustainment was turned over to the sponsoring organization.

Figure 6.2
KM Learning Delivery Support



RAND *MG1016-6.2*

- BCKS, CALL repositories, and CALL staff provide a point for operational soldiers and leaders to access informal explicit knowledge.
- RDL and E-Pubs on AKO provide points for operational soldiers and leaders to access formal (e.g., Army-approved) explicit knowledge.
- The CALL and BCKS forums, repositories, and staff provide an important source of input for the development of DTTP and course content by the institutional Army.

Note that these capabilities support the institutional Army as well as soldiers in the operational force. Importantly, instructors and training developers in schools can and should utilize the KM learning delivery forums and repositories to update their courses' content and their own knowledge. In addition, KM learning elements can be used in collaborative phases of DL structured courses and with guidance from an instructor. For example, students in structured courses might be assigned to research important questions using forums and repositories.

Moreover, instructors should participate in the forums and contribute to the repositories to strengthen their benefit. The role of TRADOC's instructional community should include not just course instruction, but also the follow-up and updated learning accomplished on the KM repositories and forums.

BCKS Program

The BCKS office has responsibility for developing and maintaining a capability to support training, leader development and education, battle command, and doctrine.[8] This office has also been informally designated as the Army's proponent of operational KM.[9] At the end of FY 2008, the BCKS office had around 4 military personnel and just over 60 DA civilian and contract personnel. In FY 2007, it executed an annual budget of just over $8 million.[10] The BCKS office maintains a website on AKO that supports a collaboration capability for specific training and leader development communities (forums) and also provides a limited knowledge object repository.

Forums. Forums are distributed networks that provide the ability to link commanders, leaders, staffs, and soldiers from a specific community across the force to establish virtual teams of professionals connected through online collaboration systems. These forums provide a "community of practice" capability for peer discussions and professional dialogue among users to enable shared learning and knowledge generation. For example, a member of a leader forum can ask other forum members about their ideas for counseling a subordinate. With the permission of the forum leader, each forum is open for any soldier or civilian with an Army-related function and a need to join.

---

[8] TRADOC Regulation 10-5-4, *Organization and Functions,* U.S. Army Combined Arms Training Center, February 2006.

[9] FM (Interim) 6-0-1, *Knowledge Management Cell,* was authored by personnel in the BCKS office.

[10] Most of this funding was provided as a supplemental from year-end funds. The budget at the beginning of the fiscal year was about $1.5 million.

There are over 60 forums under the BCKS umbrella, and this number is continually growing.[11] The forums cover a range of overlapping functional, staff, leadership, and organizational communities. A sample listing of some of these forums is shown in Table 6.1.

We include the Warfighters' Forums associated with FORSCOM's corps and their subordinate organizations as parts of BCKS, even though they are under the sponsorship and funding of FORSCOM and their responsibilities include supporting mission command functions as well as community-of-practice functions.[12]

Within each forum are topic groups, or subject areas related to the community, and links to related websites. For example, the Mounted Maneuver Forum has topic groups like "Master Gunners Section" and links to the *Armor and Cavalry Journal* website. Each forum also has its own repository of key documents, articles, and other knowledge objects. Most forums send out weekly email updates to forum members summarizing important queries, recent articles of interest, and other activities. Many of the forums have a "Request for Information" (RFI) capability. For example on the Warfighters' Forum's StrykerNet portal a user can direct a question to the forum staff who, supported by the Corps and FORSCOM staffs, will then research the issue and provide an answer.

Table 6.1
Examples of BCKS Forums

Community Area	Example Forums
Functional	Mounted Maneuver, Fires, Civil Affairs
Leadership	NCO, Company Commander, Platoon Leader, Command
Staff	S-1, S3/XO
Organizational	Stryker BCT/I Corps, Heavy BCT/III Corps, Army Reserve

[11] By "umbrella," we mean that these forums can be accessed through the BCKS portal. However, most of the forums can also be accessed directly through AKO.

[12] The purpose of the Warfighters' Forums is to "support training and leader development, collaborate and share ideas, and find solutions to common problems." Participants are offered the opportunity to "learn, innovate, decide, and act faster than our adversaries while operating in a condition of consistently high OPTEMPO in protracted conflict." FORSCOM Warfighters' Forum Portal, https://www.us.army.mil/suite/portal/index.jsp.

Each forum has a forum sponsor (e.g., a TRADOC center commanding general or similar senior leader), a forum manager, and topic leaders. The BCKS office provides funding for many, but not all, forum managers, but the remainder of the forum staff and contributors are voluntary, in that either an organization or an interested individual provides the work "out of hide." The forum leaders and topic managers are the critical element in successful forums. While respecting the need for open discussion, forum leaders and topic managers must provide a certain amount of policing, and must aggressively search for relevant knowledge objectives to post and distribute to forum members to keep the forums current. They are also responsible for seeing to it that knowledge is shared more generally when appropriate.

The content of the forums varies by the level of leader and topic manager effort and sponsor-provided resources. One of the more well-supported and expansive forums is the Stryker Brigade Combat Team Warfighters' Forum (SWfF).[13] The SWfF is a community of purpose within the Stryker Brigade Combat Team FORSCOM and TRADOC community, with its StrykerNet WfF portal providing a conduit for operational experience to enable quick adaptation and high performance.[14] The SWfF has a ten-person permanent staff and a robust capability to develop content and provide tailored responses to requests for information. It includes a number of features demonstrating that BCKS and its forums could complement and extend the Army's DL capabilities. These include leadership and operational training classes, exercises, and learning tools.

Repositories. To supplement forum repositories, the Warrior Knowledge Base (WKB) provides a web-based, central BCKS repository of data, information, references, and knowledge (objects) needed by BCKS users. It is focused on achieving information interoperability across BCKS objects. Besides providing an internal repository, the WKB also has links to the other BCKS forums, CALL, and the AKO's RDL and E-Pubs site.

---

[13] Hallmark and Gayton (forthcoming) for a detailed description and assessment of this forum's potential.

[14] StrykerNet Staff (2010).

In addition to the BCKS staff, 11 soldiers from the USAR's 84th Division support the WKB effort on weekends and during a two-week annual training period. They review documents, determine which should be included in the WKB repository, and provide searchable keywords (also called "metadata") to support search functions. This repository is established by its manager and contains objects submitted by forum leaders. While labeled a BCKS repository, WKB does not currently include a capability to directly search within other forums. The lack of such a search capability is partly the result of the need to protect forum member internal discussions, but it is also due to the difficulty of developing the technical capability to search across forums.

CALL Program

CALL is a TRADOC Center operating under the CAC commanding general. CALL "collects, analyzes, disseminates, and integrates new concepts, TTP, and solutions throughout the Army from the tactical through strategic levels of war, with a primary focus on operational issues, as an agent of change throughout the Army."[15] At the end of 2008, CALL had approximately 12 military and about 170 DA civilian and contract personnel; its annual budget was just over $17 million in FY 2007.

Compared to the BCKS forums, CALL has a fairly robust staff of SMEs who work full time at Fort Leavenworth, key TRADOC centers and schools, Combat Training Centers (CTCs), and with units. This staff researches "observations, insights, and lessons" (OIL), assesses their value, and develops products from them that provide vetted "lessons learned" to the Army. These are distributed in hard copy and in online documents that range from single-page "Lessons of the Day" to pamphlets of 100 or more pages covering emerging TTP on an area of operational importance, such as TTP for stability and support operations. CALL also produces lessons learned videos, which are available both online and through distribution.

---

[15] CALL's mission statement, from U.S. Army Combined Arms Training Center, *Organization and Functions,* TRADOC Regulation 10-5-4, February 2006.

CALL's KM learning delivery is made up of two useful functions. First, CALL maintains open, restricted, U.S. classified, and NATO classified websites, which provide a repository for all CALL-developed products as well as related documents that its analysts have found of potential benefit to units and other users. These sites use topic tabs (e.g., branch, echelon, training), which allow users to quickly find products of interest. There are also several types of search capabilities, a catalogue of products, and links to related sites.

A second useful function is CALL's RFI capability, which is available to U.S. military and government agencies, coalition partners, and civilians with an approved need for access. Military analysts search the archives and contact SMEs to provide the information back to the requestor. The goal is to provide a response within 24 hours for deployed units and 72 hours otherwise. In FY 2008, CALL responded to an average of over 900 RFIs a month. Obviously, the level of effort that can be provided is limited by the size of CALL's staff, but at a minimum it is able to send a package of relevant material. In cases of greater urgency or importance, a more extensive "staff study" effort can be made to access sources outside of the CALL archives and provide a tailored, more extensive response.

As an important supporting capability, CALL has representatives at key points throughout the Army to support its collection and dissemination mission. For example, CALL representatives are located at each division and corps, the CTCs, mobilization sites, and TRADOC schools and centers. This wide distribution of CALL personnel has proved valuable because it not only provides an "inside ear" to hear about ongoing operations and initiatives, but also facilitates the dissemination of information to help unit leaders conduct their operational and training missions.

CALL also provides MTT support on request. The MTT supports deploying and training units by providing a snapshot of the current operational environment, which is based on near-real-time in-theater observations, lessons learned, AARs, and TTPs. It is designed as a seminar with information briefings and facilitated discussion, not as a tactical-level training tool.

CALL's primary limitation is simply the size of its staff. Because its staff resources are limited and response times are short by design, the knowledge objects it addresses generally cover a narrow area and focus on specific situations rather than the comprehensive coverage generally presented in doctrinal publications. In addition, as with all KM repositories, search capabilities pose a problem for the time-constrained unit user.

Army Knowledge Online Doctrinal Repositories

The Reimer Digital Library (RDL) and E-Pubs are repositories on AKO that contain all approved Army publications, including doctrinal Field Manuals, Training Support Products, Soldier Training Publications, regulations, pamphlets, and other such official publications. The repositories enable the user to look up publications by type and by series or number. A search of publications is possible if the searcher generally knows what type of publication to look for, but a search capability focusing on specific content in a publication or across publications is not supported. AKO also has a search engine, but its utility is limited.

A major issue with the content of these AKO repositories is currency of these authoritative references. The Army has been challenged to develop a complete set of doctrine and fully vetted TTPs for the current operational requirements. For example, the Army's operational-level doctrine for counterinsurgency operations was published in late 2006, over three or more years after these types of operations began in Afghanistan and Iraq.[16] Moreover, the tactical-level doctrine for counterinsurgencies is still under development and has not yet been codified into a published FM.

The major cause of this issue is that the operational pace and the pace at which enemies adapt has combined to increase the rate at which doctrinal and training products must be revised, enhanced, and augmented. It is thus difficult for the institutional Army to keep current with operational requirements and practices. A contributing factor is the general reduction of TRADOC staffing over the past decade or more.

---

[16] FM 3-24, *Counterinsurgency,* December 2006.

A major goal of the KM program is to provide for more effective collaboration between the operational and institutional Army to increase the rate at which enhanced doctrinal and training content can be developed as well as delivered. In this respect, CALL and BCKS KM capabilities represent as important a resource for the institutional Army as they do for soldiers and leaders in the operational force.

There are many other websites on AKO with information and knowledge products that can promote learning in soldiers and leaders in operational units. For example, each TRADOC proponent school has a home page, and often the latest drafts of doctrinal materials are available on these sites. Similarly, most units and organizations have websites with relevant materials. However, there is currently no truly usable search capability among the various websites. This lack is partly due to the fact that, for security reasons, many of the sites and subsites require authorization from the site or subsite manager to gain access.

Importantly for this study, the IMI modules developed and being developed under TADLP, and which certainly would be helpful given these objectives, are not directly accessible through AKO unless the user is enrolled in the course supported by the module.

Ongoing KM Learning Delivery Enhancements

The high-level interest in improving overall KM capabilities, including KM learning delivery, is evidenced by the emphasis the senior Army leadership has expressed in a series of KM guidance documents. For example, a July 2008 memorandum from the Secretary and Chief of Staff of the Army stressed Army KM principles and emphasized the importance of previous Army KM memoranda and AR 25-1, *Army Knowledge Management and Information Technology*.[17]

The emphasis by TRADOC leadership seems equally strong. General Wallace, a former TRADOC commanding general, commissioned a study to examine and make recommendations for improving TRADOC's KM programs. This extensive, well-structured study

[17] See HQDA (July 2008).

was conducted by BAE Systems and concluded that TRADOC's KM programs needed greater synchronization and improvement across the board.[18]

Partly as a result of the BAE Systems study, in January 2008 the TRADOC commander directed the formation of the Combined Arms Center–Knowledge (CAC-K) organization to address the challenges outlined in the BAE Systems report.[19] CAC-K is to be "an organization that synchronizes knowledge creation, organization, application, and transfer in order to enable understanding and support decision making." This is a positive development in terms of KM improvement, especially in terms of achieving greater unity of effort by bringing together, under a single organization, not only CALL and the BCKS office, but also CAC's Combined Arms Doctrine Directorate (CADD), Combat Studies Institute (CSI), and *Military Review,* all of whom play a role in Army learning delivery.[20]

Benefits of KM Learning Delivery Programs to Operational Forces

To assess the benefits of the KM learning delivery programs, we examined three primary sources: our own recently conducted study of leader development in units, the 2006 Army Research Institute (ARI) Sample Survey of Military Personnel, and the BAE Systems study of KM. We

---

[18] BAE Systems (2007).

[19] Headquarters Combined Arms Center, *OPORD 08-050A, Formation of CAC-Knowledge,* February 2008.

[20] The role of CADD is described in TRADOC Regulation 10-5-4, *Organization and Functions:* CADD performs "overall management, integration, and quality control of Army doctrine; integrates Army doctrine vertically and horizontally within the Army; integrates Army doctrine with joint and multinational doctrine; represents the Army in multinational doctrine committees; and performs other doctrine-related tasks." TR 10-5-4 outlines CSI's mission as follows: "Conduct and publish research on historical topics pertinent to the current doctrinal concerns of the Army." The *Military Review* mission is to "create a long-term schedule of themes and develop articles which facilitate full discussion of emerging issues to assist the development of concepts and doctrine," and to "establish a network with other Services, other Army professional journals, and other agencies to improve mutual support."

also visited selected KM learning delivery sites in order to obtain an independent estimate of their benefit from a unit leader perspective.

RAND Study of Leader Development in Units

In 2006 RAND conducted a study of leader development in operational units, which included an extensive set of surveys of and interviews with 405 officers from the grade of lieutenant to major.[21] The survey asked officers whether they had participated in an online forum (e.g., BCKS). It also provided a list of 12 leader development activities and asked them to select the top three activities that "were most effective in developing your leadership qualities and teaching leadership lessons." These activities included "participation in online forums" and also such activities as professional reading and participation in training events such as a Command Post Exercise (CPX) or Field Training Exercise (FTX).

The surveys found that 42 percent of the majors and senior captains and 36 percent of the junior captains and lieutenants participated in online forums. In terms of leadership development benefits, only 7 of 282 members of the junior group and 2 of 123 members of the senior group selected "online forums" as one of the top three most effective activities, and this was the least-selected activity overall.

This low ranking should not be viewed as a criticism of the benefit of these forums. Many of the other choices involved activities that more directly involved exercise of leadership skills (e.g., deployments, CTC and training events). Considering this, the fact that the forums were chosen as one of the top three activities by anyone at all actually indicates a reasonable perceived benefit.

A finding of greater concern is that so few officers in the survey group had even used the forums. Much of our concern stems from the fact that the pioneering forum, and probably the best known, is companycommander.com, and this one would be well aimed at this group.

---

[21] Schirmer et al. (2008). The study surveyed and interviewed 282 junior captains and lieutenants and 123 senior captains and majors.

Our follow-up interviews provided some insights on the benefits of the forums and repositories and how they could be improved. In general, those who used these forums found them at least somewhat useful. A few participants found them highly useful, but most saw them as one of the sources of information they might use to support immediate operational or training needs, and less so as sources of advice on good leadership techniques and traits, which was the focus of the survey questions. When this topic was discussed, a general thread was that "There is too much information out there" and that there is great difficulty in quickly finding the specific information needed. Almost everyone surveyed seemed to think that the current capability to do this is inadequate. The inadequacy of effective search engines on the forums and for AKO itself was nearly always brought up during discussions of this topic.

There also seemed to be limited confidence in the benefit of some of the information available through the forums and repositories. Many said that "You don't know how good it is." Such comments applied to both BCKS and CALL. Most officers seemed to prefer going to someone they knew, whose views they felt they could trust, rather than accepting outright the advice or information received through the forums. This does not mean that the forums were not used—the data indicate otherwise—but that most saw them as supplementary information sources.

ARI Distance Learning Findings

During late 2006, ARI conducted a survey of just under 4,800 officers and just over 5,200 soldiers and NCOs on a range of topics, including the frequency of their use of AKO forums and communities and participation in online discussion groups.[22] The results showed that over 80 percent of officers used AKO forums or communities "not at all" or "infrequently." For NCOs, the comparable rate was around 70 percent.

---

[22] ARI, *Distance Learning Findings from the Fall 2006 Sample Survey of Military Personnel,* March 27, 2007.

RAND Stryker Warfighters' Forum (SWfF) Study

In 2009 RAND conducted an assessment of the SWfF.[23] This study included a web-based survey that examined the StrykerNet forum usage. The survey had 1,359 officer and NCO respondents, and the results showed that only about one in four respondents had visited the site and over half of those used it for training or self-development.

While these usage rates are similar to those described above, the study pointed out that the benefits of such a forum are not limited to direct usage, but also include indirect benefits. For example, if a unit leader used the site to support a leader development session or to revise the unit's tactical standard operating procedures (SOPs), or if a doctrine developer used the forum as a source for revising a field manual, the benefit would reach a far wider audience than individuals who directly used the site.

BAE Systems KM Study

As a part of the BAE Systems KM study effort, over 300 individuals in units and TRADOC were interviewed, and surveys were conducted of over 4,000 NCOs and officers.[24] The study found that

- "Much of the perception from the field is that DTTPs (Doctrine, Tactics, Techniques, and Procedures) are often not current, timely or relevant."
- "The primary factor that would encourage Soldiers to contribute more OIL (Observations, Insights, and Lessons) is increased confidence in the vetting process."
- "No systematic process exists to quickly and efficiently extract "knowledge nuggets" from diverse sources of content."

Overall, this study, while confirming the need for an effective KM program, concluded that improvements were necessary to better achieve the program's need and potential.

---

[23] Hallmark and Gayton (forthcoming). This report also provides insights into why soldiers used the SWfF and demonstrated its use to develop and refine training content.

[24] BAE Systems (2007).

Conclusions, Directions for Improvement, and Better Integration with TADLP

We have concluded that the functions provided by KM learning delivery are highly important to leader training and development. They serve a key DL function and complement TADLP's effort to support structured learning in the framework of formal courses. The learning that a soldier gets in the institution can decay after the completion of the course, elements of it can become dated, and new, important elements may be added to the course. Thus, KM learning delivery forums and repositories provide an updating and refreshing function that augments formal institutional training.

The capabilities provided by the Army's major KM learning delivery programs provide a range of knowledge support to the operational force, as summarized in Table 6.2.

Table 6.2
KM Learning Delivery Capabilities

KM Learning Delivery Program	Contributions	Limitations
BCKS	• Supports development of tacit knowledge via collaborative forums • Rapidly distributes relevant knowledge objects (e.g., journal articles) directly to community members • Maintains repository of current, relevant knowledge objects	• Limited, but some vetting • Limited search capability • Stovepipe nature of forums • Staff size
CALL	• Has repository of vetted, current TTP • RFIs provide responsive, researched answers to queries from unit leaders • Unit representatives can help units leaders use CALL capabilities	• Knowledge objects compartmentalized • RFI responses limited by staff size/expertise/time • Search capability limited • Staff size
AKO RDL/ E-Pubs	• Provides fully vetted doctrine and TTP	• Much content is not current and many key areas not currently covered • No effective search capability

BCKS provides the most responsive support and contributes to tacit knowledge development; CALL provides responsive, somewhat vetted TTP; RDL provides fully vetted doctrine and TTP but, as pointed out previously, TRADOC's processes and doctrinal development resources have been greatly challenged by the amount and rate of change in the operational environment and the ensuing requirements for training support material. A challenge for users is the lack of integration across sources, i.e., a user must perform multiple searches to get desired information.

Needed Improvements

Based on our review, it is fair to say that while these efforts are seen as useful by many leaders in the operational force, a far larger number either do not use them or see them as being of limited benefit. The lack of a significant benefit is related to a combination of factors, including the limited time unit leaders have available for such efforts and the difficulty of searching for effective solutions among the vast number of sites and knowledge objects available. As a whole, unit leaders want access to reasonably good solutions to their specific knowledge needs quickly. Since there is no simple or inexpensive path to fully or even partially provide this capability, those responsible for making improvements in this area face real challenges.

A more responsive ability to update and disseminate doctrine and TTP and to supplement the structured education (formal courses) of leaders are both acknowledged areas for improvement. Moreover, we found that the organizations with the responsibility for performing these functions are making reasonable efforts to improve them.

Currently, there are ongoing efforts to develop IT support capabilities and to achieve better synchronization of existing KM learning delivery efforts. While such efforts are likely to be helpful, there is little reason to think that major improvements are likely in the near or even middle term. The need for improvement is great and there appear to be no major increases likely in program resources.[25]

---

[25] Based on HQDA, "TSPU MDEP: Training Support to Units," March 19, 2008.

At the heart of the matter is the "people" part of KM. The effectiveness of the processes used to develop content and its effective distribution will depend primarily on the amount of expert manpower involved. For example, to support an effective search capability, the value of the content needs to be assessed, and the content needs to be broken into discrete knowledge objects and meta-tagged with descriptions to facilitate search. The effort needed to do this across all KM repositories is large. There are promising technologies that could support such an effort, but in the end, expert judgment will be the key resource needed for significant improvement. Even with better meta-tagging and more effective search engines, expert manpower will still be needed to take the wide range of inputs and coalesce them into packages suitable for most unit users.

The major limitation that could impede these initiatives is staff size, especially for BCKS. Much of the staffing is provided by supplemental and end-of-year funding. In addition, these missions are the responsibility of specialized organizations that are, in most aspects, outside the mainstream TRADOC instructional and doctrinal development effort.

Directions for Improvement

The KM learning delivery mission is highly important in light of the current and expected future operational environment. While many organizations are supporting this effort, and great benefit to the operations force has been provided, a more integrated effort seems clearly to have the potential to provide great benefits to the operational force. Unit users do not have the time to search through all the potential sources of information to find answers and solutions. They generally want a concise "good enough" informational product that can be directly adapted to their specific situation, rather than a set of references that needs lengthy review and evaluation.

Enhanced RFI Capability. A single supported RFI capability could be created that would include a capacity to go to the "TRADOC expert" to formulate a response. TRADOC's proponent system could be used to identify topic leads, who would serve as a school's experts in a selected area and who would be responsible for keeping current in

the topic area. For example, the MP School could designate an expert for the topic "preserving the integrity of an incident site." The overall concept would be to create a "telephone book" of experts on a long list of specific tasks and topics.

Forum Integration. Some combination of greater integration and streamlining of the BCKS forums also seems to be needed. While there is obvious value in the concept of small, informal communities, it is hard to understand why there are separate forums for Heavy BCTs and Mounted Maneuver. A leader looking for a suggestion from the armored/mechanized forces community should not have to make separate requests to each forum. A BCKS weekly update system could be integrated so that each soldier receives a single, tailored update.

Improved Search Capability. The need for an effective search capability across KM learning delivery sites has been a well-documented and recurring theme in this chapter. Across TRADOC's KM learning delivery program staffs, we also found full awareness of the need to enhance capabilities to search within and among the various repositories; these staffs are making major efforts to improve technical search capabilities. But the challenges of creating effective search capabilities are significant, especially given security needs and limited access to specific sites. There has been considerable effort in this area, to include consideration of commercial solutions such as Google, but limited progress. The solution cannot be based on IT alone. The capacity must be based on effective meta-tagging, which requires the judgment of many subject matter experts and a common system across sites.

KM Learning Delivery as a Core TRADOC Mission. Overall, we recommend that a fully effective KM learning delivery capability become a core TRADOC mission, and that this effort should be systematically supported by the integration of all the expertise residing in TRADOC.

Integration of TADLP and KM Learning Delivery

We conclude, further, that the efforts of KM learning delivery programs and TADLP should be better integrated for the mutual benefit of both, and to achieve an enhanced leader development capability overall. One possible integration alternative would be to combine these

programs. However, the focus areas of KM and TADLP differ, and combining them into a single program would, in our estimation, create an unmanageable scope of effort. For example, the BCKS forums and CALL efforts involve not only learning delivery, but also collection and analysis of knowledge. The KM programs have been shaped to accomplish all three functions and should not be separated out. Thus, while we do not recommend combining the two programs, we do recommend that one organization should take the lead in integrating and advocating for efforts to support learning in the operational force. The TCM for TADLP is the logical choice, given the TCM's charter of coordinating the Army's overall distance learning efforts.

The major need is to establish a more collaborative, mutually supporting effort between the schools' instructors and training and doctrine developers on the one hand, and the CALL and BCKS programs on the other. TRADOC's instructor pool represents an important part of the Army's institutional knowledge, which should be shared and available outside the scope of structured instruction. Also, given the rate at which operational experience becomes dated, the KM sites provide an important mechanism for maintaining instructor currency.

Obviously, school SMEs can, and many do, benefit from the updated capability of CALL and BCKS. Besides using their capabilities, school SMEs should support CALL and BCKS efforts by participation. This appears to be happening in many cases now, as the CALL and BCKS sites are used and supported by many school SMEs, but such participation is generally on an individual basis; it could be encouraged and perhaps better coordinated by policy and command guidance.

Another example illustrating how integration between CALL and BCKS could be of benefit would be the placement of IMI modules that present knowledge ELOs on the BCKS and CALL sites and make them findable using KM search systems. Updated content should be available to all soldiers, not just those enrolled in a course.

Moreover, as course material is updated, there should be a mechanism to identify critical changes and to disseminate them through an integrated forum system. For example, if the infantry school develops an enhanced technique for searching a room, and develops a

video showing and explaining the technique, that product could be announced on the forum weekly updates, and placed in CALL and BCKS repositories. Besides providing benefit to the operational force, this dissemination would provide a mechanism for school instructors and training developers to get feedback from a broad range of leaders in the field, thus supporting improved instruction.

There are additional ways in which KM programs and structured training could be mutually supportive. For example, CALL products, including videos, could augment DL-collaborative and resident instruction. In addition, leader courses could teach students the use of KM learing delivery capabilities while delivering training. For example, students could be coached to use CALL and BCKS sites as a source for practical exercise solutions and encouraged to become active members of the appropriate BCKS forums. Such use would also allow school SMEs to assess the effectiveness of these sites, and provide constructive feedback for KM site and program improvement.

Mutual support could also help in the development of improved collaborative technologies and methods and of a better understanding of their potential. In this regard, effective forums and effective asynchronous collaborative instruction are similar in many respects, e.g., threaded discussions and course practical exercises. What is learned about one could benefit the other.

A final important point is the need to coordinate the development of integrated IT capabilities to support both KM and DL systems and programs in the same way, so that the soldier in a unit does not have to learn multiple IT procedures for access to each. Coordination to ensure that the IT and bandwidth capabilities can support both programs will also be important, especially as programs expand.

CHAPTER SEVEN

Enhancement of Key Management Functions to Achieve TADLP Transformation

In a previous chapter we described how the Army's leadership is planning for a greatly expanded TADLP role that will support the achievement of its training and readiness goals. We also outlined how an enlarged TADLP could potentially support this requirement; and concluded that a truly transformed TADLP capability is required to meet the Army's goals.

Continuing with the final stage of our analysis (as outlined in Figure 1.2), this chapter addresses our final recommendation for broadening TADLP. Specifically, it describes the assessment, planning, coordination, and implementation actions that are necessary to achieve TADLP transformation. We focus on actions for the TCM because the TCM for TADLP has the TRADOC staff responsibility to "develop and implement policies, plans, and programs for TADLP throughout the Army training environment."[1] Given this responsibility, the TCM for TADLP has the central role in DL management activities.

We specify four key functions that need enhancement to effectively achieve TADLP transformation and suggest directions that the TADLP TCM could take to reach that goal for the TRADOC commander.

The key functions we discuss are:

- Evaluate and assess ongoing TADLP.
- Develop concepts, plans, and directives for TADLP transformation.

[1] TRADOC Regulation 10-5-4, *Organizations and Functions*.

- Implement a spiral development approach to achieve evolutionary transformation.
- Perform combat developer role to ensure that needed support is provided.

A fifth important function, integration of TADLP and knowledge management learning delivery to provide the Army a more comprehensive distance learning capability, is covered in the previous chapter.

Coordination, Integration, and Collaboration Across the Army Are Needed to Accomplish Functions

The TCM will need to coordinate the development and implementation of a transformed TADLP approach across a wide community of stakeholders and array of issues. Below we describe the key stakeholders and relevant issues to be coordinated and integrated.

Headquarters, Department of the Army. Under the G-3/5/7 Director of Training (DOT), the Institutional Training Division has overall staff responsibility for institutional training and TADLP, while the Leader Development Division has primary DA staff responsibility for leader development program guidance and policy support, as well as for ensuring that these programs support an overall Army leader training and development strategy.

But many other staff elements are also involved and interested in training and leader development, especially the Army G-1, which has primary responsibility for personnel readiness.

The TCM should coordinate with the DOT to ensure that appropriate Army-wide policies are in place to ensure TADLP success, and that the DOT has the needed information and data to formulate and make the case for program resources.

Headquarters, TRADOC. The TRADOC commander is responsible for the execution of institutional training. The TCM should coordinate within this headquarters to ensure that a feasible role for TADLP is defined, that this role and its priority are understood throughout TRADOC, and that TADLP is properly resourced with

staffing and the support of subordinate schools and centers to accomplish its mission.

Army Training Support Center (ATSC). ATSC is a TRADOC field operating activity. It supports TADLP efforts by providing DL management support, DL Education and Training Products (DLETP) contact services, DL testing, and development of DL technical standards and specifications. The TCM should coordinate with the commander of the ATSC to ensure that ATSC's efforts effectively support TADLP.

Combined Arms Center (CAC). The CAC commander has the TRADOC lead for leader development and functional training—the two types of courses most heavily supported by TADLP. The Army Leade Development Program is the responsibility of TRADOC, and a program office has recently been set up under CAC.

Also under CAC is CAC-Knowledge (CAC-K), an organization that oversees TRADOC's knowledge development and knowledge management learning delivery efforts. CAC-K's efforts to distribute unstructured learning to the Army complement TADLP's efforts to give the Army a comprehensive DL capability. As we discussed in the previous chapter, the TCM should coordinate with CAC-K to ensure mutual support and overall Army benefit.

Supporting Army Component Commands, Army Service Support Commands. Numerous Army organizations support the Army's ability to conduct DL. For example, the Army Materiel Command's (AMC's) Distributed Learning System (DLS) Program Manager develops the ALMS that supports DL and manages the distance training facilities. The Army G-6 and the Installation Management Command's (IMCOM) Directorates of Information Management (DOIM) provide the network connectivity to allow web-based DL delivery. The TCM should communicate these needs and coordinate to ensure that they are being addressed.

Supported Units. The customers for DL are the soldiers and leaders who take courses and the commanders who benefit by having graduates able to successfully perform organization missions and tasks. For the TCM, this requires continuous liaison with troop-owning commands, both AC and RC, development of policies governing the pro-

vision of TADLP instruction to soldiers, and program adjustment to provide better support.

Schools and Other Training Organizations. These are the organizations that design, develop, and implement DL and resident courses to meet the needs of their proponent customer organizations as outlined by DA and TRADOC regulations, policies, and other guidance. This includes not only TRADOC, but also RC institutional training organizations. For NCOES, the U.S. Army Sergeants Major Academy is responsible for developing common core instruction, and the proponent schools are responsible for MOS-specific instruction.

This listing is far from inclusive. The key point is that the coordination and integration of DL into an overall leader training and development construct involves many important stakeholders within and outside of TRADOC. Thus the TCM's coordination role is large, important, and complex.

Evaluate and Assess Ongoing TADLP

Key to program management and improvement is the establishment of a means to evaluate and assess the program to support needed improvements and timely adjustments. This is especially critical considering the increased expectations for TADLP to expand its support of training and leader development strategies.

A Structured, Supported Evaluation and Assessment Program Is Needed

Our overall finding is that no systematic evaluation and assessment program is in place at the program level. Clearly, program evaluation and assessment is a critical TCM function, not only for program management, but for making an effective case for resources and support. We argue that this function is one needing immediate improvement, and that an effective system could be established based on the methodology outlined in Chapter Three.

The assessment system outlined in Chapter Three is based on five measures of effectiveness: program impact, efficiency, quality, cycle time,

and responsiveness. Establishing such a system depends on collecting data to form the measures of effectiveness. In previous sections of this report we presented sources and methods for such data-collection efforts. In this section we present our further suggestions on how TADLP evaluations and assessments and supporting data-collection efforts can be expanded and improved.

Assessments Should Address Broader Quality and Responsiveness Issues

As discussed in Chapter Three, the evaluation and assessment of DL courseware quality are primarily decentralized. Proponent schools are responsible for validating IMI courseware to determine whether its content is consistent with course learning objectives. However, our observations indicate that there is a need for a broader range of these evaluation efforts. They should be more comprehensive and based on standardized measures to enable synthesis of results across courses or schools. Guidance on how to conduct such evaluations also needs to be updated.[2]

At TADLP level, quality and responsiveness assessments are limited. The only evaluations focus on technical compliance of courseware to SCORM and ALMS standards; there are no evaluations to provide information about the quality or currency of instructional material. At program level, we found no systematic effort to oversee or collect data from the proponent IMI courseware quality-evaluation efforts. As a result, TADLP does not have sufficient data or data integration to gauge overall IMI courseware quality or the responsiveness of the courseware development system to keep material current. More-

[2] The guidance on IMI courseware development is in TRADOC Pamphlet 350-70-2, *Multimedia Courseware Development Guide,* June 2003. The guidance in terms of quality control and courseware validation is general. For example, the discussion of courseware validation states that "Validation is an essential step in the development of all training materials," but provides no effective direction on how to accomplish this essential process. The training developer community in TRADOC is aware of shortfalls in its overarching training development regulation, TRADOC Regulation 350-70, *Systems Approach to Training Management, Processes, and Products,* March 1999, as well as supporting pamphlets, and is in the process of revising these publications.

over, we found no effort of any kind to evaluate or assess the effectiveness of other types of distance learning, such as VTT courses.

Limited plans appear to be in place to enhance TADLP level quality assessments. A 2006 draft of the Campaign Plan for TADLP describes a "new" Training Effectiveness Assessment (TEA) program in which the TCM will "develop, test, and implement a system for DL TEA. The system will require graduates and supervisors to assess the graduates' abilities to accomplish tasks taught through DL."[3] Evaluation will depend largely on the use of the AUTOGEN survey system. AUTOGEN surveys ask course graduates and their supervisors to provide judgments (using "yes" and "no" response options) about the extent to which the graduates can perform tasks to standard. Proponent school staff also can add customized questions to the survey. AUTOGEN surveys are typically fielded six months following course completion. Reports show, for each task, the percentages of graduates and supervisors who said that the task was being performed adequately and also highlight discrepancies between the two groups' responses. Reports also include the number of participants sampled, response rates, some demographic characteristics, and reasons for nonresponses.

AUTOGEN can serve as a tool to identify areas for improvement in training. Improvement might be indicated by a low percentage of "yes" responses, showing that few supervisors or graduates report that graduates were trained to standard, or by large discrepancies between graduates' and supervisors' judgments as to whether graduates were trained to standard.

In our assessment, however, AUTOGEN is not fully suited to meeting TADLP needs for evaluation. The most critical issue is that, for most courses, AUTOGEN does not provide information about the quality of DL because: (1) AUTOGEN surveys are administered after students complete training and return to their units, and (2) DL is typically used in a blended model. Therefore, responses to AUTOGEN surveys do not distinguish learning that occurred in DL from learning that occurred in resident training or during unit training after the

[3] U.S. Army Training and Doctrine Command, *TRADOC Campaign Plan with Change 1,* June 2006.

completion of resident training. Such a distinction would be possible only if: (1) a course was taught entirely through DL; or (2) tasks in a blended course were taught exclusively through DL.

There are a number of other issues with AUTOGEN that pertain to DL as well as other training methods:

- Supervisors are asked about performance of graduates as a whole rather than performance of graduates on an individual basis. Therefore, AUTOGEN cannot link individuals' performance in training with their performance on the job, which is an important component of evaluating training effectiveness.
- Participants are asked about the tasks on which graduates are trained to standard. Despite the existence of defined standards for tasks in soldier training publications, there may be different ways that respondents interpret "to standard." This renders the results ambiguous or noncomparable between graduates and their supervisors or across different supervisors.
- AUTOGEN collects only subjective ratings; it does not include objective measures of learning or job performance. Moreover, in some cases, supervisors in the units do not have enough information to even subjectively evaluate graduates' job performance.
- Course graduates often do not perform the tasks on which they were trained. Therefore, even if supervisors are well informed about graduates' job performance, the graduates may not be performing the tasks taught in the course.
- Collecting ratings from graduates directly is problematic in that self-ratings can be subject to social desirability biases.
- Our interviews with proponent school staff suggest low to mixed receptivity toward the AUTOGEN system. Some staff report low response rates for AUTOGEN surveys, particularly from personnel who are located overseas with limited Internet access.

Currently, AUTOGEN surveys are developed and administered by the proponent schools, without any aggregation of results at the program level. As a result, TRADOC does not have information such as school compliance, graduate and supervisor response rates, average rat-

ings, and so forth. Without aggregate data, there is no way, at TADLP managerial levels, to know the value of the AUTOGEN system or to use the data to evaluate courseware quality.

While this review of AUTOGEN highlights its limitations, we think it could be developed to play a useful role in an evaluation and assessment program, both at proponent schools and, if the data are shaped and shared, at TADLP managerial levels. It does provide potentially useful data on how well tasks are trained in stand-alone courses. Moreover, items can and should be added to give information on how students take DL courses and how well they are supported in this effort. For example, students could be queried about whether they took courses on personal or duty time, whether they had problems connecting to the course sites or with courseware navigation, and how courses could be changed to better serve their needs and constraints. They also could be asked about their views of how far and by what means TADLP benefits could be advanced.

Moreover, the focus of AUTOGEN is on course quality, but the TCM has a much wider range of responsibilities and must meet the needs of diverse customers or stakeholders including students, unit commanders, and school staff. This calls for a much broader program of quality and responsiveness evaluation.

Table 7.1 identifies an approach and data that could support a more comprehensive program to evaluate DL course quality and responsiveness. For example, evaluations of the content of courseware by SMEs and surveys of commanders could be used to evaluate whether DL is meeting current training needs; cycle time for courseware development could provide information about the currency of courseware.

In Chapter Three we outlined our approach to evaluating the quality of IMI courseware against three important criteria: technical, production quality, and pedagogical. As outlined in Chapter Four, we think an adapted version of our IMI quality assessment should be implemented at TADLP level, but enhancement would further increase its benefit. An enhanced evaluation should involve taking the course as the students do (mainly online), and would include evaluation of test adequacy, which we were not able to do for the course modules we evaluated. Some of the data we collected on DL course usage could pro-

Table 7.1
Approach and Data to Support Evaluation and Assessment of Quality of TADLP Training

Criterion	Metric/Data
Does IMI courseware have appropriate instructional design: technical, production, and pedagogical quality?	• Adoption of RAND's approach as described in Chapters Three and Four – Take online and include test review • Enrollment and dropout rates • Student surveys—potentially by an expanded AUTOGEN system addressing the general adequacy of DL courseware and methods
Is TADLP meeting current training needs, i.e., is it providing training for critical knowledge and skills and is training up to date?	• SME evaluations of courseware content • Enrollment and dropout rates • Student and commander surveys on additional learning needs for stand-alone DL courses • Cycle time for courseware development
How well are students learning?	• Tests of learning and performance on critical tasks/TLO following DL portions of training • Student and supervisor surveys of task performance in DL stand-alone courses • Administration of tests measuring knowledge retention of concepts (ELO) taught in DL prior to start of resident phase in courses using the phased approach to training • Instructor and student surveys

vide indicators of courseware quality issues. For example, high dropout levels could indicate technical or content issues. Graduates could also be surveyed about both their overall satisfaction with TADLP courses, and their satisfaction in specific areas.

Additional evaluations and data collection would also be necessary to provide a complete understanding of course quality. Of primary importance would be checks of courseware completeness, currency, and accuracy. SMEs would be a primary source for such evaluations. While these evaluations are, and should be, the responsibility of the proponent school, they could be selectively done at TRADOC level as well, for purposes of monitoring the overall program.

Also of great importance would be an evaluation of the extent to which course learning objectives were attained, i.e., whether the students actually learned what the course was designed to teach. Here

the primary mechanisms would be tests of student performance conducted soon after course completion. For TADLP courses in which learning objectives are ELOs in preparation for face-to-face instruction, this could be done by testing the knowledge of the subject matter taught in the DL phase at the beginning of resident training, and instructors and students could be surveyed or interviewed during or at the end of the face-to-face portions about the adequacy of TADLP preparation.

Assessments Should Address the Amount of Training Developed and Conducted

In Chapter Three we presented data on the impact of TADLP in terms of the amount of training conducted and the proportion of overall institutional training represented by TADLP courses. We think that this evaluation was useful both in terms of showing program impact objectively and showing where improvements might increase the impact.

Our evaluation was limited by the data sets available. With improved data, more would be possible. For example, we could not count the number of active, ARNG, or Army Reserve enrollees or graduates and there was no way, given facility utilization records, to quantify the amount of facilities usage that supported DL course execution, or to determine whether these facilities were used and needed by students to take IMI courses. However, we think that setting up enhanced tracking and analysis methods could greatly increase TADLP's ability to conduct these types of analysis. For example, ATRRS could be cross-referenced with personnel databases, and digital usage logs could be maintained at DTFs.

Therefore, we think our methodology for evaluating TADLP should be incorporated into a larger TADLP evaluation program and expanded to further the benefit. In Table 7.2 we show some additional approaches that could be taken.

RAND's analysis of courseware usage statistics can provide other indicators of training benefits (or the lack thereof) and the efficiency of TADLP training. For example, RAND found that many DL courses were developed but never used or had short shelf lives; these are important indicators of how well TADLP, contractors, and schools execute

Table 7.2
Approach and Data to Support Evaluation and Assessment of the Amount of Training Delivered by TADLP

Criterion	Approach and Data
What DL training is being executed?	• Number of TADLP enrollees and graduates by: – course – proponent – course type (e.g. VTT, IMI, asynchronous collaborative) – student component • Percentage of TADLP course execution compared to overall institutional course execution by: – course and student – course type – proponent
Is the training getting to the soldiers who need it?	• Enrollment rates versus requirements • Backlog of unqualified leaders
Is training available when and where needed?	• Surveys of commanders and students
What is the courseware production amount, cycle time, and lifespan?	• TRADOC contract records • ATRRS

their TADLP mission and an important factor in a cost-benefit approach to program assessment. Low student enrollments and/or high dropout rates could be indicators of low courseware quality, and low enrollments could also indicate that courses are not available when needed. Ultimately, follow-up investigation would be needed to systematically identify the reasons behind these issues. Surveys and/or interviews could be conducted of school staff regarding unused courses; of students who drop out of courses regarding their reasons for doing so; and of potential students regarding reasons for nonenrollment.

Better Collection of Cost Data Could Enhance Efficiency Assessments

Efficiency assessment requires the comparison of program costs and outputs—the quality of courses and their impact. During our evaluation of TADLP, we found data on the contractor costs for developing IMI courseware and costs of supporting the operation of DTF facili-

ties, but only limited data were available in other important areas, e.g., on the total costs of IMI courseware or of VTT-delivered DL courses.

Although contractor IMI development costs per course were captured, our examination of courseware quality indicated that there is a level of uncertainty about what those costs really mean. Courseware contract rates are determined by interactivity levels and hours, but our sampling, though not systematic, found that much of the courseware was at lower interactivity levels than contracted for, and there were indications that some lessons could be completed in fewer hours than indicated by the POI. Given this finding, we recommend that, as a minimum, interactivity levels and length be integrated into the content assessment of courseware recommended in Chapter Four. Further, the TCM should ensure that a check on interactivity levels and length becomes a component of proponent school IMI validation processes.

Table 7.3 describes an approach and the data needed to support an evaluation and assessment of the costs of TADLP training.

During our examination of IMI production processes and interviews with school and IMI contractors, we found that the major issues with IMI courseware production quality and production time arose from lack of adequate school support, specifically GFI/GFM, subject matter experts, and front-end analysis. Clearly, a better understanding

Table 7.3
Approach and Data to Support Evaluation and Assessment of the Costs of TADLP Training

Criterion	Metric or Approach
What are the costs of DL development and implementation?	• The cost of IMI courseware—by interactivity level and hour • Supporting costs, including: – instructor and other staff time for development and execution – student time to take courses – travel: student, instructor, and staff – equipment – facilities

of these requirements and shortfalls is important to future program improvement. Collecting staff manpower cost data in such areas across all proponent courses would require a major effort, but a case study approach, examining development and execution of DL for a selected set of courses, would be feasible and would provide for better estimates of critical support requirements for IMI.

Moreover, in light of our recommendation for expanding DL to include more than stand-alone IMI, cost data on MTT, VTT, and asynchronous DL approaches should be collected. Especially valuable could be collection of data to allow a comparison of DL versus resident course costs.

Establishing a Structured, Supported Evaluation and Assessment Program

We recommend that the TCM start by immediately establishing a program-level evaluation and assessment program and staffing an office directly responsible for this function. Based on our efforts, we think that RAND's approach could be quickly implemented and expanded with a small, two- to three-person staff element.

This evaluation and assessment program should take the business management approach we discussed above. While a strict cost-benefit analysis approach is not feasible, given the somewhat subjective nature of TADLP benefit assessments and the difficulty of quantifying supporting costs, an approach that reasonably estimates costs and benefits is possible.

A complementary need is to establish standardized counterpart proponent school programs. In the current, decentralized process, evaluations are generally localized, resulting in diverse approaches that cannot be aggregated at the program level. While training evaluations and assessments should continue to be conducted by the proponent schools, an integrated approach is needed. We recommend using a collaborative process to designing such an approach by drawing on expertise from staff in a subset of proponent schools. We suggest enlisting these staff to serve on a temporary task force headed by the TCM that would be responsible for identifying, designing, and codifying standardized methods and metrics that can be used across schools and

courses.[4] For example, the Armor Center's methods of test evaluation, which have shown benefit in identifying problematic items, might be used to refine tests or, more importantly from a strategic perspective, to identify areas where course improvement is needed. These methods could be standardized and extended across proponent schools. This task force could also be responsible for disseminating information about these methods to the community of proponent schools through TRADOC pamphlets, handbooks, or other similar documentation as well as workshops or similar training provided to other school staff.

A collaborative approach that involves staff from the proponent schools offers a number of advantages, including:

- Involving staff who know what will work and not work in their organizations.
- Enlarging the pool of staff available to contribute to development of new efforts.
- Enhancing commitment to decisions.
- Providing an opportunity for learning as participants share their experiences.
- Providing credible "PR" to market new efforts to others in the training community.

A second strategic issue for TADLP is to ensure that training staff in the proponent schools have the skills they need to carry out training assessments. We address this topic in more detail later in this chapter.

Develop Revised Concepts, Plans, and Directives

Once an ongoing DL evaluation effort is established, the starting point for transformation is to develop concepts and a plan for expanding DL to support a greater proportion of institutional training with the larger

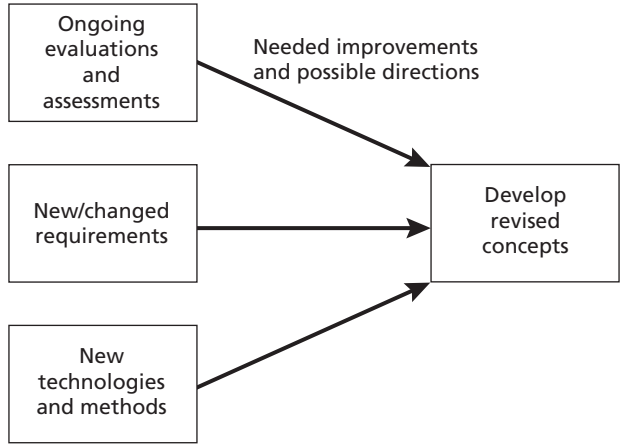
[4] It may be appropriate to design assessments that enable integration but also allow for customization. For example, a standard set of questions on student satisfaction surveys can enable TADLP to aggregate results at the program level. At the same time, each school may wish to add questions that are specific to its context.

goal of improving the Army's ability to provide needed, timely training to support operational readiness.

Figure 7.1 illustrates the inputs that should be considered in developing concepts for expanding the use of DL to better meet changing requirements. A key element is that concepts leverage the potential of new DL technologies and methods discussed in Chapter Five.

While the specific blends of DL types, MTT, and resident learning will vary by the type and number of tasks and learning objectives in each course, we think a consensus can be reached to develop general guidelines on what tasks, skills, and types of knowledge could best be taught by each modality. For example, under such a construct, practical exercises and tests of critical hands-on equipment tasks would most likely be accomplished by face-to-face modes at resident schools or by MTTs. Knowledge of tactical concepts as an ELO could often be delivered and tested by asynchronous IMI, but the understanding and application of these concepts to actual scenarios would generally require collaborative DL, realistic games or simulations, or face-to-face modalities to be done to standard. In general, any instruction that is currently done in a classroom could be considered a target for IMI

Figure 7.1
Developing a Concept for a Transformed TADLP Capability



RAND *MG1016-7.1*

and collaborative DL methods, although careful attention is warranted regarding the higher-level learning typically required for successful achievement of TLOs.

These concepts should be based on reasonable assumptions about the Reset environment and unit readiness needs. For example, for many courses it would be reasonable to assume that unit equipment and assistant instructors could be made available to support MTT course execution. Use of MTT with unit equipment could in fact be a preferred option, as there are obvious advantages to training on the actual type of equipment the unit will use during the collective training that will follow the Reset phase in the ARFORGEN cycle.

Concepts Should Be Developed in Collaboration with the Entire Training Community

These concepts should be developed by a knowledgeable working group that includes empowered representation from across the instructional and user community. The instructional community should include instructors and SMEs, as well as training developers and IMI contractors. Experts for civilian academic, training, simulations and gaming, IMI, and IT communities should also be brought in to support the effort.

We also think a collaborative process would facilitate other important outcomes, including the exchange of best methods and practices and achievement of a common understanding of the capabilities of the various DL modalities and of what can and cannot be done by each.

Participation by the unit user community is especially important. Key to a viable concept is an understanding of the type and amount of training needed, how much is possible given time and other resource constraints, and the priorities assigned to different aspects of the training. Even more important is gaining consensus with unit-owning commands concerning the equipment, facility, and instructor support that can be reasonably provided and the policies that can be established for student availability.

This group would develop more than concepts for using DL; rather, the objective would be to understand how to effectively blend

DL and face-to-face training modes.[5] The goal would be to move as much TDY instruction as feasible to an exported mode, and to expand, to the degree possible, the number of critical tasks taught, while still maintaining standards.

Based on the concept developed by these efforts, the TCM, in conjunction with other directorate-level members of the TRADOC institutional training staff elements, would develop an overall TRADOC strategy for moving along a path to making real, responsive progress toward meeting the ACP, TCP, and recent Chief of Staff of the Army (CSA) guidance.

The TCM would develop implementation plans for these concepts, with the initial priority being given to TDY courses needed during Reset and to courses that help meet the CSA's guidance on NCOES backlog reduction. Planning would be coordinated within TRADOC and with DA, unit-owning commands, and supporting commands. TRADOC plans, agreements with unit-owning and supporting commands and activities, and DA policies would follow.

Command Emphasis and Direction Will Be Critical

These actions would culminate in TRADOC commander directives to proponent training organizations to begin implementation, including timelines and specific objectives.

Experience shows that strong command emphasis is key. Although there has been broad guidance to move to greater DL support for institutional training since the initiation of the DL program over 10 years ago, the level of change implemented has been limited.

Many factors have contributed to this limited degree of change, with low funding levels for TADLP certainly being one of the most significant, but our interviews with school staffs indicate that proponent schools have been reluctant to shift from the current, almost exclusively resident-based approach for active component instruction. There is some basis for this reluctance, since there is certainly inherent value in traditional resident small-group instructor methods. This includes

[5] TRADOC would need to provide additional guidance on how to achieve the appropriate blend to achieve optimized learning and readiness benefits.

the advantages of getting students away from the day-to-day interruptions of home-station activities and of gathering them in groups whose members have a range of experiences to share and who can help each other develop solutions. The notion of "If it ain't broke, don't fix it" has some merit, and the traditional courses certainly were not broken. Rather, the issue is that the training environment has changed in many ways, and training delivery must change to ensure that needed training is getting to soldiers in a timely manner.

Given the limited distance learning capabilities currently in place, we conclude that much stronger command direction will be needed. Our discussions of both the Navy's IMI program (in Chapter Four) and the Special Forces DL initiative with regard to its ANCOC (now SLC) course (in Chapter Five) indicate that clear, unambiguous command direction and support is a prerequisite for achieving real change.

Develop Plans and Directives to Provide for Effective Transition

The transformation discussed above needs to be made in a way that preserves the benefits of current training methods, and to be carried out in an evolutionary manner to avoid disrupting an effective functioning training system. This is why a consensus-building approach is needed, not only to develop a reasonable concept for institutional training transformation, but also to ensure that the command guidance for executing the transformation is feasible and allows for reasonable transition.

In this regard, an example is that movement to a fully exported NCOES mode for all soldiers in the unit ARFORGEN cycles is probably not feasible or necessary. Some technology-focused low-density MOS-exported execution may not be possible if needed equipment, simulations, and simulators are not available at most home stations. However, a reasonable goal might be to reduce TDY portions to a maximum of two or three weeks, with proponents having the capability to request exceptions with justification. This would largely achieve the CSA intent of supporting unit readiness, reducing NCOES backlog, and limiting soldier time away from home station during Reset. Such a goal may be feasible for many MOSs if the Army adopts the options described in Chapter Five, especially since many hours seem to involve "classroom/discussion" instruction, and often the equipment required

is available from the unit. To the degree that this is the case, movement to a DL base is possible if the following conditions are met:

- Most classroom training is moved to IMI and collaborative DL.
- Equipment needed for hands-on training (MTT or otherwise) is available at home stations.
- Troop-owning commands agree to provide equipment and facility support and establish policies that commanders make soldiers available for NCOES attendance during Reset.

It is possible to start moving fairly quickly to a construct in which NCOES has a far greater exportable component. This has particular promise for SLC-level courses, which tend to have smaller hands-on components and for which achieving minimum small-group sizes tends to make MTT approaches less feasible. However, decisions about how and how much to move toward exported training need to be made in a collaborative fashion and validated during a spiral development process (described later in this chapter).

Overall, the evidence we have gathered strongly suggests that responsive movement to a decreased residential component is possible. This contention is supported by the efforts in ALC Common Core, SF SLC, and TRADOC's recent efforts to deliver many high-density ALCs by MTT. While there are many advantages to resident courses, we think that the advantage of providing adequate training to more soldiers who need it—reducing the NCOES backlog—is of greater overall importance.

We also note that, even with the movement of NCOES to an exportable mode, resident options for MTT phases for some MOSs may need to be maintained for soldiers not in units. Moreover, maintaining resident options would provide scheduling flexibility.

Implement a Spiral Development Approach

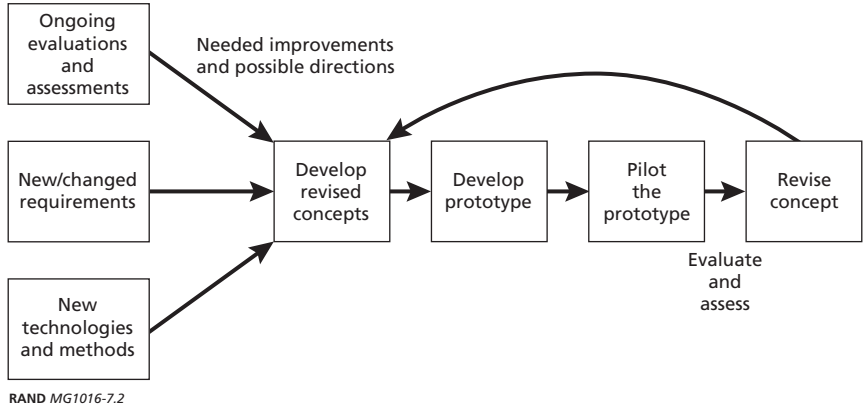
The approach we suggest to achieving a transformed TADLP capability is similar to the spiral development process used by the Army to

develop new Table of Organization and Equipment (TOE) organizations. The process is one of "build a little, test a little, build a little." This process is illustrated in Figure 7.2.

Spiral development is a method of rapidly implementing change. Under this process, an initial version of a product or program is developed as a kind of work in progress. In this case, the product might be any of a number of new DL courses that use an approach substantially different from the majority of existing DL courses and that achieve a substantially increased usage of DL modalities in the instruction. The assumption is that a working prototype will be fielded early, allowing it to be refined and revised in stages. As shown in Figure 7.2, the prototype is developed based on the new concepts developed to address needed improvements and new requirements and to leverage the potential of emerging technologies and methods.

The prototype then is piloted using a real-world trial effort. During the spiral development process, developers and users observe and assess the performance of pilot efforts in order to understand what works and what does not. When improvement is needed, analysis is performed to develop and field a revised, improved version. Likewise, any helpful technology advances that have occurred can also be incorporated into the next version. Once an improved version of the prod-

Figure 7.2
The Spiral Development Process



uct or program is fielded, the process of assessment and revision starts again. Thus, the process is one of planned evolution. Each step results in further improvements to the product or program. Such a process is consistent with the DoD Training Transformation Plan.[6]

An Evolutionary Approach Is Prudent

A spiral development process offers the most feasible approach to enhancing TADLP's contributions while allowing for adequate testing and understanding of the capabilities of the various DL modes. Such a process is needed since the expanded DL program we outlined earlier represents a significant change in how training will be developed and conducted, and the effectiveness of these options has yet to be demonstrated or refined. For TRADOC to implement a fully expanded exportable training capability, the training support community will need to work out many details concerning training effectiveness, organizational, and budget issues. Spiral development will allow such issues to be resolved over time while allowing change to begin immediately. The idea of evolutionary change assumes that a product or program will change and adjust as the Army conducts evaluations and gains experience and understanding. Such an approach also allows for the early involvement of stakeholders in the change process.

Evolutionary change is best made step-wise, with early efforts designed to gain as many insights as possible into lessons that can guide future implementation. Transition plans and even end-state goals will likely need continuous adjustment. A wide range of participation in early implementation efforts not only leads to a wider range of input but also serves the objective of consensus building.

Evaluation, Assessment, and Adjustment Are Key

For the spiral development process to work, there must be a strong evaluation and assessment program. The evaluation and assessment processes presented earlier would all apply but would need expansion to support spiral development. Emphasis is placed on determining whether the revisions developed actually work to improve course ben-

---

[6] Department of Defense, *Strategic Plan for Transforming DOD Training,* February 2009.

efits without unduly increasing costs. In the case of moving toward a greater level of exported delivery of NCOES, it is particularly important to compare DL with residential instruction in terms of the number of tasks that can be included in the instruction, the adequacy of student learning, and the overall costs.

Spiral development would also require detailed planning and an adequate organizational structure to support enhanced evaluation and assessment activities such as data collection, measurement of student learning, establishment of an AAR system, and structured interviews with students, instructors, and training developers.

A model that could be used is the Stryker Brigade implementation effort, which was designed as a spiral development process.[7] CALL and proponent schools also supported the evaluation, assessment, and improvement process.

Evaluation and assessment efforts should begin early enough to capture all implementation costs and required efforts. For example, the man-days used by instructors to develop and revise the IMI courseware should be recorded. When coupled with evaluation of the effectiveness of this IMI, these data could help estimate what future efforts of this type would require. These data could also help lead to a better understanding of what types of IMI would be reasonable for schools to develop internally, and what types would be best to contract out. Other important data include the manpower effort needed to coordinate the execution of exported training, both by the school and by home station leaders and staffs.

A special area of interest would be the effectiveness and instructor costs of collaborative DL methods in delivering classroom instruction. Understanding what can be done by IMI, asynchronous collaborative

[7] Specifically, the Army used a spiral development approach for the Stryker Brigade Combat Team (SBCT) program. Program assessment and revision for the SBCT was the responsibility of a dedicated organization, the Brigade Coordination Cell (BCC), with approximately 70 assigned personnel headed by a brigadier general. The purpose of the BCC was to coordinate SBCT transformation, assist in development of transformation documents, provide lessons learned related to current, interim, and objective forces, and help educate the Army on SBCT and related transformation concepts. Using the spiral development process, the Army was able to implement rapid, effective improvement, resulting in the development of the entire SBCT system to deployable readiness levels less than two years after initial manning.

DL, synchronous collaborative DL, and actual face-to-face instruction, as well as how to effectively integrate these methods, is central to determining how far and fast it will be possible to move to a greatly expanded use of DL.

Because resident options will be maintained, at least initially, some level of subjective comparison of effectiveness would be possible and beneficial. While rigorous test-like comparisons are desirable, these are not likely to be feasible, but SME judgment could still provide a reasonable basis for making assessments and adjustments.

Training Development Staff Development Programs Should Be Enhanced

In order to keep pace with the transformation, developers and instructors in the proponent schools must have the knowledge and skills to design, implement, and deliver many different modalities of DL. Currently, responsibility for the training and development of DL training staff (e.g., developers) is localized in the proponent schools, only a limited amount of structured TRADOC-level developer training is offered, and TRADOC/ATSC does not maintain information about what educational opportunities are available. ATSC offers some basic courses in SAT and Automated Systems Approach to Training (ASAT) for training developers and offers several courses for instructors (Small-Group Instruction, Army Basic Instructor Course, Video Teletraining, and a newly developed course, Asynchronous DL Instruction).[8] We did not find any existing courses—or plans to offer courses—on topics such as media selection, models of learning (e.g., blended learning), IMI development, IMI delivery, the DL contracting process, or training evaluation. ATSC does not have the resources to offer such training, either by teaching it in house or contracting it out. We see a need to provide such training for proponent school staff and anticipate that this need will grow as training requirements increase, technolo-

[8] Most of these courses run 3 or 5 days, or 24 to 40 hours. The Army Basic Instructor Course is longer, at 80 hours. In addition, the Advanced Distributed Learning (ADL) Co-Lab offers several SCORM courses.

gies change, and schools become more directly involved in courseware development rather than outsourcing it to contractors.

We also identified a variety of other resources for training development staff, but these resources are not available in one central location and, while potentially helpful, appear at present to offer only a limited capability:

- The DL knowledge network (DLKN) on AKO has "knowledge centers" for AKO users who are involved in DL courseware design and development. According to TADLP's website at the time of this research, the purpose of DLKN is to "share ideas, lessons learned, and developing guidance and specifications; seek and offer solutions to technical issues; and collaborate with others in the DL community."[9] DLKN has the potential to provide a centralized, online location for information exchange, but there are only a small number of people who have posted to the centers. Most of the knowledge centers contain documents for use by the community at large, such as copies of briefings from the annual DL workshop from 2006 or the DLETP kickoff meeting from 2006 and general DL technical alerts. However, we did not see any information-seeking that one might typically find in a community-of-practice forum.
- The Training Development and Delivery Directorate (TDADD) webpage has links to a variety of resources such as job aids relevant to training in general and to IMI in particular, guidance for DL development, and a draft "DL XXI" guide.[10] TDADD has been reorganized into the Distributed Learning Directorate; however, these resources for training staff can be accessed only through the TDADD webpage.

Moreover, as discussed previously in this report, TRADOC guidance and guidelines in the form of regulations, pamphlets, handbooks, and other publications are limited and dated. Revisions are ongoing, but

[9] As of February 1, 2011: http://www.tradoc.army.mil/tadlp/links.htm

[10] As of February 1, 2011: http://www.tradoc.army.mil/g357//tdadd/index.htm

the effort is going slowly; given the current staff and other resources devoted to this effort, major near-term improvement is not likely.

Considering the dynamic nature of DL capabilities and methods and the need to expand and enhance training development capabilities, we think that a major goal of the pilot assessment efforts should be a structured effort to identify, observe, analyze, and assess training development practices. Such an effort should codify, document, and distribute lessons learned and best practices, using the AAR and data-collection efforts that will be part of the larger spiral development assessment effort.

Perform Combat Developer Role

An important specified role for TCM is to serve as the combat developer for the technology that supports TADLP execution. For example, execution of DL is heavily dependent on

- Learning management system capabilities to provide access, tracking, testing/assessment, and record-keeping.
- Information technology to provide hosting and serving of content, required bandwidth to deliver the content, and interaction with the content via PC and browser "client" for the learner, both for IMI content and collaborative tools for instructors and learners.
- IMI technology support as the means to deliver instruction for noncollaborative or instructor-supported or -led DL, and to maintain that content over the course lifecycle.

TADLP's use of these technologies must also continue to evolve to take advantage of the rapid pace of technology advancement on the commercial side in such areas as quality and delivery of IMI, "serious" gaming, and wider-bandwidth uses of collaborative technologies (such as web-based, desktop video teleconference).

The envisioned expansion of the DL program to a far greater number of learners will require a greater capacity for students to connect to IMI content and collaborative DL tools. Increased student

throughput could create demands for such resources as bandwidth and workstations that exceed current and projected capabilities. Thus, increased oversight and guidance by the TCM may well be needed in the coming years to obtain increased resources and achieve the usage goals for DL.

ALMS Use Case Shows Importance of TCM

Below we further discuss the "use case" of the TCM's role as combat developer regarding the ALMS in order to explore how the TCM might better meet the needs of its program and its customers. As described in Chapter Two, the combat developer is responsible for establishing requirements and representing the user community through the materiel development process of the ALMS, while the materiel developer creates the solution based on the requirements. The combat developer and materiel developer must work together to ensure that the ALMS requirements are appropriately written, that the solution developed meets those requirements, and that the end customer's needs are ultimately met by the solution.

To date, the ALMS program has made significant investments in achieving LMS capabilities by using a blend of COTS products. While under development since 1996[11] and fielded in 2004, the ALMS currently is used by few schools, including some large schools that are very active in DL and that develop high-priority courses. Some large schools, including ones that are very active in DL, have developed their own LMS solutions. Many schools have reported that the originally provided Saba Enterprise services are not user-friendly, do not provide all the capability they need, and provide capability they do not need (while making the tool more difficult to use). Some schools report that they are satisfied with Blackboard-based solutions alone.[12] And others also report that they have not been adequately funded to carry out the

[11] The Army Distance Learning Program was approved in 1996 and had an Operational Requirements Document (ORD) published in 1999, with revisions in 2002. The ALMS "Engineering and Manufacturing Development" (EMD) began in August 2000.

[12] Blackboard Inc. is a software company based in Washington, D.C. that develops and licenses software applications and related services to educational institutions.

transition of content from local LMSs to the ALMS. (See Appendix B for schools' comments on the ALMS that derived from our survey.)

Defining Requirements That Meet User Requirements Is Key

These reports provide potential lessons learned for future TCM participation in the materiel system requirements definition processes. In any development effort, a key to success is providing a sound foundation of well-specified user needs. Realistic requirements must be gathered and synthesized across user stakeholder groups (e.g., proponent schools and students) with potentially very different needs. These requirements must also be achievable within realistic system/product costs.

A key responsibility of the TCM as combat developer is to produce appropriately scoped and defined requirements documents that clearly outline expected, realistic, and needed capabilities. In the case of ALMS this role may not have been fulfilled. For example, some features of the ALMS software requirements specification may have received more emphasis than warranted. In particular, the ALMS specifications supplied by the combat developer seemed based on an assumption that all schools were following the complex training development processes and developing the products outlined in TRADOC Regulation 350-70, "Systems Approach to Training Management, Processes, and Products." In fact, most schools lacked and still lack the required training development and management staffs to follow SAT processes: actual training development and learning management practices were far simpler, but they were not reflected in the requirements nor later in the ALMS that was developed.[13]

Testing to Ensure User Requirements Are Met Is Also Key

Another key combat developer responsibility, as representative of the user community, is to conduct sufficient testing to ensure that customer's needs are met by the system before and after it is fielded. There

---

[13] TRADOC Inspector General Report, *Soldier Training Review,* dated December 2005. A major conclusion was that that while the SAT process was basically sound, the staff resources and training for its implementation were lacking. TRADOC is now in the process of rewriting this regulation.

is evidence to suggest that the TCM could have played a stronger role in assessing the ALMS's ability to meet school needs when first implemented. There were several issues that arose as the ALMS was fielded and courses were developed to meet the ALMS data requirements and requirements to conform with SCORM. One such issue was the reported complexity of the process by which schools would prepare, test, and upload courses to the ALMS. Many schools also felt that the ALMS requirements included SCORM data conformance requirements that provided no local benefit to the schools, but did impose extra development and testing burdens. These requirements served to slow the fielding of completed IMI courses, as content had to be revised and retested for conformance.[14] This example shows the importance of an effective acceptance testing program to identify and make appropriate modifications prior to fielding. The TCM might also have played a stronger role in this process by specifying criteria for acceptance testing in a more detailed requirements document.[15]

The TCM Can Also Play an Important Role in Guiding and Obtaining Resources for Product Improvement

Looking ahead, the role of the TCM in supporting the user community will become even more important if TADLP is to significantly expand. For example, fully supporting schools in migrating to, or initially placing content on, the ALMS may well require some additional resources that were not specified in the ALMS definitions in DLS Increment 3 Systems Requirements Specifications.[16] One way to accomplish this is to further evolve the concept of ALMS support to schools. For example, the ALMS materiel developer (PM DLS) has already initiated a customer service approach that has moved away

---

[14] An additional aspect of reported problems with SCORM conformance was that the requirements were being changed at many points in the ALMS fielding process.

[15] An example would have been specifying options for opting out of certain aspects of SCORM conformance for content that has a low probability of being reused by other training developers in Army schools.

[16] Distributed Learning System, System Requirements Specifications: Increment 3, V2.1–8, submitted by IBM, September 8, 2005.

from "training school staff members to use the ALMS" to providing much more direct support. Instead of relying on school staff to learn and retain technical software expertise that is rarely used, the evolving approach is to provide the service for the school. Courses are being converted and uploaded by ALMS customer support staff, who are also customizing access to the content to meet the schools' requirements. These additional services are resulting in customer satisfaction among new ALMS users—primarily users just starting out with their DL program. By supporting an expansion of this approach, the TCM might also help meet the needs of schools that have evolved their own systems to meet early needs and who are now reluctant to change.

In addition, in order to bring about TRADOC-wide use of ALMS resources, the TCM may have to provide additional support and incentives to prove ALMS capabilities, to build trust in the centralized solutions, and to move content to the centralized solution. There are possible blends of solutions that could support incremental migration; for example, some proponents might take advantage of central hosting of IMI but local hosting of Blackboard. A different approach would be to allow local LMS operation with the requirement to provide automated feeds of all ALMS-required data to the central ALMS system. Such data feeds would have to meet the ALMS requirements and be funded by the local schools for development and maintenance.

Another approach would be for the TCM to move toward including "performance-based" metrics into software requirements, e.g., measuring user satisfaction or levels of migration of content, over time.[17] Under such an arrangement, the materiel developer would not be responsible for simply providing the system and training for its use, but would be evaluated based on aspects of system usage and customer satisfaction.[18]

---

[17] It is important to note that there are well-defined change-management processes to guide the evolution of features/capabilities of the ALMS. These are described at http://www.dls.army.mil/CR_Process.html.

[18] RAND has published research supporting the use of "performance-based" contracts in sustainment of Army materiel systems.

Summary

Overall, the TCM should investigate how to improve its ability to provide effective, continued general oversight of system effectiveness after fielding in conjunction with the materiel developer and the user community. There may also be other management or coordination efforts that the TCM could champion to (a) increase the satisfaction of users with materiel capabilities, (b) ensure that materiel developers are producing systems and products that meet user needs, and (c) determine how to obtain the increased resources needed to achieve DL usage goals in the coming years.

Chapter Conclusions

In this chapter we outlined what we think are the important TADLP functions that need enhancement.[19] These functions are necessary for institutional training transformation to achieve the improved training support called for by the Army's leadership in the Army Campaign Plan and other guidance. All aspects of TRADOC functions supporting Professional Military Education, functional training and self-development programs should be reexamined and their priorities reassessed in terms of current critical needs. To the degree that DL capabilities must be expanded, priorities should be revised and resources reallocated.

Moreover, we point out that a necessary change for an enhanced DL capability is increased command support. The TCM can and should coordinate an effective transformational shift to an enhanced DL capability, but in the end, success will be a function of the extent to which the Army's leadership emphasizes the need for change and provides resources and other support to achieve it.

---

[19] We have specified functions without attempting to analyze the current staffing levels of the TCM, TRADOC Headquarters, DLS, or ATSC. Reallocation of staff to implement these functions, along with contract funding and school support for spiral development, would help to support the suggested enhancements.

CHAPTER EIGHT

Conclusions, Recommendations, and Implications

In this report we have examined the benefits of TADLP in terms of five measures for courseware effectiveness and in relation to near- and long-term readiness needs. Based on this examination, we have outlined possible ways to improve development of the IMI courseware that constitutes the core of the current TADLP efforts, and also taken a broader look at how DL could be improved over the longer term to reach larger Army readiness goals.

Conclusions

Our assessment of TADLP's existing program for developing interactive multimedia instruction (IMI) courseware (as of FY 2008) led to the following major conclusions:

- TADLP courseware has had a narrow focus that limits its potential.
- Our assessment showed a need for TADLP improvement with regard to all measures of effectiveness (program impact, efficiency, quality, cycle time, and responsiveness).
- TADLP lacks a structured process for evaluation, assessment, and improvement.
- The potential exists to significantly expand the role of DL in Army training.

Recommendations

We then identified five near-term initiatives that would increase the impact of the Army's current IMI program, increase the quality of the product, and improve the efficiency and responsiveness of the process. We also outlined three broader options for increasing the program's impact and improving cost-effectiveness. These near-term and broader recommendations are summarized in Table 8.1.

Table 8.1
Summary of Near-Term Initiatives and Broader Options Recommended in This Report

Near-Term Initiatives
• Add flexibility to the courseware acquisition strategy
• Ensure sufficient resources per training module for stand-alone IMI
• Undertake systematic process improvements to reduce IMI cycle times for production
• Increase local participation in IMI production and contract administration
• Institute a program-level IMI evaluation component to support TADLP improvements
Broader Options for Increasing Program Impact and Cost-Effectiveness
• Employ blended learning options to significantly expand DL's role
• Integrate TADLP with knowledge management (KM)
• Enhance TADLP management functions

Overall, these recommendations constitute a case for significantly expanding the use of structured and unstructured learning to enhance the Army's training and leader development strategies. While the directions recommended here represent a shift from some current practices, we believe such changes are needed for DL to play the key role it has been assigned in leader development strategies and in the transformation of training in the Army.

Implications

History suggests that making the proposed changes will not be easy and will require more than the details discussed in this report. The issues facing the Army's leadership today are comparable in magnitude to those faced in the post-Vietnam era and the shift to an all-volunteer Army. To address these issues, General Abrams, as CSA, initiated a series of transformational training initiatives that eventually resulted in such changes as the movement to small-group instruction in TRADOC schools and the use of performance-based collective training supported by engagement simulations and AAR processes, first at the CTCs and ultimately throughout the Army. While the shift toward DL represents only one of a number of changes to training needed in the present era, we think the major lesson from the Abrams-initiated training transformation still applies: the key components to effective change will be top-down command emphasis, encouragement of and rewards for change, and systematic oversight, supported by appropriate measures of effectiveness, at program and senior leadership levels.

APPENDIX A

Interview Methods and Questionnaires

In this appendix we describe in greater detail the methods used to conduct interviews with school personnel. We have also included copies of the preinterview and during-interview questionnaires.

DL Survey Part 1

Because schools do not routinely maintain an easily accessible list of DL courses, we compiled a draft list of active DL courses identified through ATRRS, which was sent to the schools to use as a base case.[1] Additionally, a presurvey asked the schools to verify some essential facts about their active courses. Questions in the presurvey (included as Part 1 of the questionnaire in this appendix) were factual in nature and sought to determine the number of academic hours per course by type of media, who paid for the development, how the product was being used, the degree of student-instructor interaction, and whether typical enrollees belonged to the AC or RC.[2] Finally, the schools were queried as to the completeness of the course list.

[1] The draft list was the result of a search for relevant course modules within ATRRS (using "select codes"), reference to ATSC administrative data that indicated a module was embedded inside a residential course, and a cross-check with administrative data kept by TOMA on DL courses.

[2] While much of this information was theoretically available via the course administrative data (CAD) produced for the course, in practice, some of the CAD was out of date. Further, because there is no unique identifier for DL courses that lasts through their lifecycle, it was often not clear whether a course offered in ATRRS was one developed in TADLP or elsewhere.

DL Survey Part 2

We then conducted extended structured telephone interviews with officials connected with 20 Army DL programs that applied for and received TADLP funding in the past. Participants were solicited via email to schools' directors and key staff and told that the objective was "to identify policy options for making improvements in The Army Distributed Learning Program (TADLP)." Over 90 percent of the schools approached decided to participate in the study.

Each interview involved 1–8 participants from the schools, as well as 2–5 personnel from RAND. The choice of participants for the interview was left to the school. Participants typically included contracting representatives, course managers, team leads, training division or branch chiefs responsible for the production of DL, and in some cases the school's director of training. RAND participants always included the project leader and at least one other study member. Most often 3 or 4 team members participated.

Typically, all the participants gathered for one session, but in several cases RAND conducted separate interviews with different staff members and then combined the results. The interview was advertised as a 60- to 90-minute event, but it often took longer in practice, depending on the interest and availability of school participants.

Interviews consisted of open discussion, which was guided by a questionnaire sent prior to the interview (see the Part 1 questionnaire provided later in this appendix). The interviews covered a wide variety of subjects in the form of open-ended questions. To encourage candor, RAND ensured participants and schools that their answers were fully confidential. A detailed interview protocol appears later in this appendix (Part 2 of the questionnaire). Topics addressed during the interview included the following:

- The role of DL in the school's larger training strategy.
- How training content to be converted to DL was selected by the schools.
- The amount of resources dedicated to the DL program at the school, and how the personnel involved were organized.

- School efforts to assess the DL products they produced.
- Obstacles and suggested improvements related to the implementation of TADLP for that particular school.

The protocol was sent to the school and participants several days before each interview.

Notes from each interview were compiled immediately after the interview and circulated among RAND team members to insure accuracy and completeness. In one case the RAND team added a two-day site visit at one school to gain more detailed information and to verify some of the conclusions.

RAND Project Survey of Army Proponent Schools

Distributed Learning Program

Part 1: Questions to Be Addressed Prior to Telephone Interview

TO BE COMPLETED AND RETURNED
TO mikes@rand.org PRIOR TO
TELEPHONE INTERVIEW

PLEASE FEEL FREE TO CONTACT
DR. MICHAEL SHANLEY
IF YOU HAVE ANY QUESTIONS,
EITHER BY EMAIL AT mikes@rand.org
OR BY PHONE AT 310-393-0411,
EXT 7795

Summer 2007

The RAND Corporation, a nonprofit research organization dedicated to improving policy and decisionmaking

Overview and Purpose

TRADOC Headquarters TDAD is sponsoring The RAND Corporation (a nonprofit research organization) in a study of Distributed Learning in the Army. The RAND team will be conducting interviews during the summer of 2007, exploring the experience and plans of proponent schools with regards to DL. A particular focus is structured training that is key to readiness, such as PME, reclassification, and selected functional courses. TRADOC intends to use the results to formulate policies that improve The Army's Distributed Learning program (TADLP).

Instructions

To expedite the upcoming telephone interview, please answer as many of the following questions as you can about specific DL courses for which we believe you are the proponent. Any remaining questions can be addressed during the telephone interview, or beforehand via email or phone.

INSTRUCTIONS: Use your mouse to click the space or type in other information that corresponds to your answer for each of the following questions. All question answers can be edited if you want to change your answer.

Then please send the completed questionnaire back as a Word document via email.

Thank you very much for your participation.

Questions for Following Course:

Number = (course number), Phase = (Number), Name = (name of course)

1. Who paid to have the DL product developed? (Select all that apply)

a. ___ HQ TRADOC (through TADLP contracting process)
b. ___ ARNG
c. ___ Another Army organization (list _____)
d. ___ Funded internally by proponent
e. ___ Other; list _____

2. How is the DL product used? (Select all that apply)

a. ___ As a separate course phase that includes passing a test as a graduation requirement
b. ___ As a separate course phase that does not include a separate test
c. ___ Available for refresher, reachback, or sustainment training
d. ___ Available for self development
e. ___ Other; list _____

3. What degree of interaction between the course instructor and the student is envisioned during DL training? (Select one)

a. ___ Very low (questions can be asked at student's initiative through Army Help Desk)
b. ___ Low (an instructor assigned to the course can be contracted by students)
c. ___ Moderate (some student/instructor interaction is built into the course)
d. ___ High (instructor-student interaction is structured into course as a key learning vehicle
e. ___ Other; list _____

4. What is the maximum delay allowed between the completion of the DL phase and the following course phase, for the DL portion to count?

a. ___ Not relevant (e.g., DL not a separate phase of the course)
b. ___ No requirement
c. ___ (List number of days, weeks, months) (underline what applies)

5. Total academic hours of DL portion or phase of the course?

a. ___ hours

6. What are academic hours by type of media?

a. ___ hours of IMI
b. ___ hours of VTT
c. ___ hours of Web-based, instructor led training
d. ___ hours of other media; list _____

7. What is the component of typical enrollees?

a. ___ Mostly RC
b. ___ Mostly AC
c. ___ Significant number of both
d. ___ Other _____

RAND Project Survey for Distributed Learning

Distributed Learning: Experience and Issues

Part 2: Questions to be Addressed in Telephone Interview

PLEASE HAVE ALL PARTICIPANTS
REVIEW THIS DOCUMENT PRIOR TO
THE TELEPHONE INTERVIEW

PLEASE FEEL FREE TO CONTACT
DR. MICHAEL SHANLEY
IF YOU HAVE ANY QUESTIONS,
EITHER BY EMAIL AT mikes@rand.org
OR BY PHONE AT 310-393-0411,
EXT 7795

June 2007

The RAND Corporation, a nonprofit research organization dedicated to improving policy and decisionmaking

RAND's Assessment of Army Distributed Learning (dL)

- **Overview:** TRADOC Headquarters TDAD is sponsoring The RAND Corporation (a non-profit research organization) in a study of Distributed Learning in the Army. The RAND team will be conducting interviews during the summer of 2007, exploring the experience and plans of proponent schools with regards dL. A particular focus is structured training that is key to readiness, such as PME, reclassification and selected functional courses. TRADOC intends to use the results to formulate policies that improve The Army's Distributed Learning program (TADLP).

- **Purpose of interview:** As part of our assessment of dL, we are conducting interviews with members of proponent schools who are responsible for the development and production of distributed learning content. We are interested in your experiences and in what you have found to be enablers for, and obstacles to distributed learning developed by your school. We are also interested in your opinions about how to make improvements in the program.

- **RAND participants:** Drs. Michael Shanley and other members of the project team will be leading the interviews. A research assistant may also be present for the purpose of recording accurate notes.

Informed Consent Information

RAND Consent Language

- RAND will use the information you provide for research purposes only, and will not disclose your identity or information that identifies you to anyone outside of the research project, except as required by law or with your permission.
- No one, except the RAND research team, will have access to the information you provide. RAND will only produce summary information from our collective set of interviews.
- We will destroy all information that identifies you after the study has concluded.
- You do not have to participate in the interview, and you can stop at any time for any reason.
- Your participation or nonparticipation will not be reported to anyone.
- You should feel free to decline to discuss any topic that we raise.
- **Do you have any questions about the study?**
- **Do you agree to participate in the interview?**

If you have any specific questions about this about this research, you may contact:

Michael Shanley, Ph.D.
Policy Researcher & Principal Investigator
RAND
P.O. Box 2138
Santa Monica CA 90407-2138
Telephone: 310-393-0411, x7795
Email: mikes@rand.org

Tora K. Bikson, Ph.D.
Human Subjects Protection Committee
RAND
P.O. Box 2138
Santa Monica CA 90407-2138
Telephone: 310-393-0411
FAX: 310-393-4818
Email: Tora_Bikson@rand.org

Questions for Proponents on Their Distributed Learning Programs

For purposes of the following questions, distributed learning (dL) is defined as the use of technology to deliver training without the need for a collocated instructor. If an answer varies by dL area, the focus of these questions is intended to be on structured training that is key to readiness (i.e., training for reclassification, BNCOC, ANCOC, CCC, or key functional courses). In the Pre-survey you should have received, we listed courses or course phases that fall into this category for which we believe your school is the proponent.

A. The role of dL in your school's overall training strategy

1. What types of dL do you consider key to your school's training strategy?

___ IMI
___ VTT
___ Other collaborative technologies
___ web-based, instructor led
___ Other (list_____)

2. What is your school's general strategy or concept for using dL to support key structured training as described above? (If relevant, describe for each type in Question 1).

___ Increase the number of tasks that can be trained within the institution
___ Provide knowledge-based training prior to residential course phases
___ Support the instructor during residential training
___ Provide sustainment training
___ Other (specify_____)

3. In general, what other benefits do you see that dL might have in supporting key structured training in your school? (Please explain answers and indicate whether you believe any of these benefits are already being realized with current dL courses.)

___ Allows delivery of more institutional training away from schoolhouse
___ Reduces average learning time or increases training quality
___ Provides sustainment training
___ Effective for training with following characteristics (specify_____)
___ Other (specify_____)

B. dL selection process

4. For structured training that is key to readiness, what is the selection process for:

☐ choosing training to be converted to dL?
☐ choosing the approach and media used?

5. Do you use any tools/decision aids to support the process of choosing training to convert to dL, or in choosing the preferred approach and media? Explain.

6. What factors are considered in determining what institutional training is converted to IMI within your school? Explain as many criteria you are aware of.

___ Army or TRADOC headquarters directives
___ School commandant priorities
___ Importance of the instruction
___ Suitability of the instruction for IMI
___ Number of soldiers or leaders needing the training
___ Other (list)_____

C. dL resources

7. What is the approximate size of the staff that plans, coordinates, and oversees the IMI portion of your dL program (including IMI produced for use in residential courses)? Please distinguish full and part time staff and describe the overall organization within which the staff operates.

8. Are you adequately resourced to develop and deliver IMI? Please explain.

9. What additional training programs (if any) do you see as necessary for your dL staff?

10. Do you reuse or see the potential for reusing any of your school's (or another school's) IMI materials in other courses or phases? Please explain.

D. dL assessment program

11. What methods does your school use (or plan to use) to assess the quality of the IMI training or validate course tests? Please describe each and indicate any available reports.

___ Autogen surveys
___ End of course opinion surveys
___ Knowledge/skill tests during or at end of dL training
___ Other _____

E. Obstacles and suggested improvements in TADLP processes for producing dL

12. How satisfied or dissatisfied are you with your school's current IMI development program? Please rate on a 5 point scale, entering an x in appropriate box for each row.

	1.Very satisfied	2.Somewhat satisfied	3. Both satisfied and dissatisfied	4.Somewhat dissatisfied	5. Very dissatisfied
Amount of content produced					
Length of time to develop					
Efficiency of dL production					
Quality of dL products					

12a. If appropriate, answer same questions for other types of dL (e.g., VTT, collaborative technologies, web-based-instructor-led)

13. From your school's point of view, in what areas do you see obstacles or challenges for implementing a dL strategy through TADLP? Please explain in each area.

___ Contracting procedures. (please specify contract: DLXXI or DLETP)
___ Meeting GFI requirements
___ Providing SME support
___ Accomplishing course maintenance
___ Adequacy of contractors
___ Training of dL staff at the school
___ Technology required (e.g., LMS issues)
___ Incentives for schools (e.g., dL reduces school resources)
___ Cultural issues (e.g., belief that dL cannot be effective)
___ Other processes or policies (specify)
___ Other resource issues (e.g., size of dL staff)
___ Other (list) _____

14. Considering all the obstacles noted, which one(s) do you consider to be the most important?

15. What changes or improvements would you suggest to address each obstacle?

16. What do you consider to be the most important improvement that needs to be made to TADLP? Please explain.

17. Considering existing dL policies and standards and support from HQ TRADOC, in what areas would you want more guidance or support? In what areas would you want more flexibility?

F. Further explanation of data in, or not in, ATRRS

18. From ATRRS, we noticed a number of dL courses that were fielded under TADLP in the last few years, but did not appear to be currently in use. If this applies to your school, what factors contribute to the non-use of completed dL courses (indicate all that apply)?

___ Command decision or course design change
___ Content obsolete
___ Maintenance needed
___ Courses not removed—rather, still under development
___Other (specify_____)

19. ATRRS also shows there are many more enrollees than graduates in dL courses. If this applies to your dL courses, what do you believe is the reason for the low graduation rate?

20. Is there substantial use of your school's IMI material outside of structured training (e.g., for self development) that does not get recorded on ATRRS? Is there any record of this use at school level?

21. Are there any dL course phases produced by your school that you consider key to readiness but that were not in the Pre-survey? If yes, please describe, and, if possible, list information below or in separate email.

Course number	Phase	Course name	Academic Hrs	Media used
a.				
b.				
c.				

22. Do you embed dL material within residential courses? If yes, please list relevant courses and other information below or in separate email.

Course number	Course name	DL Academic Hrs	Media used
a.			
b.			
c.			

G. Conclusions

23. Do you have any additional suggestions on how to improve the management, resourcing, or processing of dL courseware through the TADLP?

24. Overall, what is the most important lesson you have learned about dL?

APPENDIX B

Potential Explanations for Outcomes from Army Schools' Point of View

In this appendix we discuss the results of interviews with training development personnel from 20 different Army schools and programs. These interviews focused on the proponent schools' assessment of the obstacles and challenges facing TADLP. This information was used as one input for recommended improvements presented in Chapter Four.

Obstacles to the DL Program

Army proponent schools identified a comprehensive list of obstacles they saw in the DL program, which we grouped into six categories as shown in the left-hand column of Table B.1. The categories are ordered according to the percentage of schools that identified a "key issue" (i.e., major obstacle or challenge) in that category, as shown in the middle column. The percentage of schools mentioning any issue within a particular category (including those of secondary importance) is also shown in the middle column of the table.

Results show that the schools found a wide range of obstacles within the DL program; note, for example, that all six categories in the table were noted by more than half the schools. In addition, the most critical category of obstacle for the schools involved the inadequate provision of resources and resource mechanisms to develop, deliver, and evaluate training. All schools mentioned some obstacle in this area, and 60 percent identified one or more key issues in this category. The

Table B.1
Obstacles to TADLP

Obstacle	Percent Key Issue	Percent Mentioned
Resource adequacy and mechanisms	60	100
Courseware development processes	30	90
Courseware maintenance practices	30	85
School-contractor interaction	30	60
Technology/IT/standards issues	25	85
Key stakeholders buy-in	5	55

remaining categories were, except for the last, given about equal weight in terms of how frequently key obstacles were noted in these categories.

The table above was derived from a telephone-based survey with representatives from 20 proponent schools. We asked participants:

- "From your school's point of view, in what areas do you see obstacles or challenges for implementing a DL strategy through TADLP? Please explain in each area."

After discussing all the challenges mentioned by a school, we asked schools:

- "Considering all the obstacles noted, which one(s) do you consider to be the most important?"

Some schools identified only one issue as the "most important," while other schools said they could not identify a single "most important" issue but instead considered multiple issues to be equally important.

In total, we received 52 nominations of "most important" issues from the 20 schools surveyed. In the following discussion, we refer collectively to these responses as "key issues." We then sorted the obstacles into the six overarching categories shown above. We will discuss each of the six categories.

Resource Issues

Overall, resource issues were cited as a challenge by 100 percent of the schools interviewed and were identified as a key issue by 60 percent of the schools, more than twice the percentage for any other category.

The most commonly cited resource issue was "a lack of sufficient or qualified SME support," either from the school side, the contractor side, or both. Seventy percent of the schools described this issue as an obstacle, and 40 percent cited it as a key issue. While support for SMEs was commonly funded in the award to contractors, according to the schools, many contractors were unable to find SMEs that were sufficiently qualified to meet school expectations.

In addition to general SME support, 45 percent of the schools noted specific DL-related tasks for which TADLP did not provide funds, with 10 percent noting these unfunded tasks as a key issue. Respondents stated that funding was lacking in several areas, including:

- Completing up-to-date GFI.
- Undertaking front-end analyses for properly specifying training requirements.
- Providing student support (both technical and substantive) sufficient to ensure high participation in the program.
- Providing a school capability for minor maintenance of courseware or the creation of simple DL products that require rapid distribution.
- Providing for assessment of the outcomes of DL training.

A significant number of schools also expressed confusion or doubt about how or whether "alternative" approaches to DL would or could be funded under the current program. Sixty-five percent of the schools mentioned this issue, and 15 percent mentioned it as a key issue. For example, despite the fact that ATSC is currently developing a blended learning model to use within TADLP, schools perceived that TRADOC might not provide sufficient funds to develop IMI content to teach more complex learning goals and for supporting instructor-led, web-based instruction.

In general, the schools expressed a desire to use DL as a way not only to provide knowledge-level learning (as do current courses), but also to support higher levels of learning, such as critical thinking and problem-solving skills. Further, schools do not feel that the current program provides sufficient funding to support a collaborative approach to training.

In explaining the problem, some schools also mentioned related obstacles, such as the insufficiency of the Army's Saba Learning Management System, as currently designed, to support anything beyond a knowledge-based, stand-alone approach. Other schools, citing their early experience with TADLP, expressed concern that bringing new, innovative efforts to TADLP would somehow lead to a financial penalty for their school.

Courseware Development Process Issues

Courseware development processes cover administrative procedures and management for the:

- submission of the application for a DL course,
- selection process for DL courses,
- development of the delivery order once a course is selected,
- development of the courseware over the period of the contract, and
- testing of the content for playability with SCORM and Saba.

Almost universally (90 percent), contractors cited some kind of obstacle in this area. However, only 30 percent of schools cited the courseware development process as a key obstacle to DL success. Nonetheless, the schools did consider this an important issue. Evidence for this comes from another part of the survey, where schools were asked about satisfaction with "length of time to develop" within TADLP. Sixty-seven percent rated themselves as "very dissatisfied," and another 19 percent rated themselves as "somewhat dissatisfied."

Schools provided a number of explanations for the obstacles they described. Nearly all schools stated that the entire process was too slow

overall. However, some also pointed to particular areas such as the time it took to

- turn an idea into a contract at the front end of the process, or
- test at the back-end of the process.

The time required for back-end testing was particularly frustrating to representatives of at least one of the schools, given how much faster a similar process could be achieved in the academic sector.[1]

A number of schools also stated that the overall process has too many steps and too much paperwork, and changes too much over time. Some schools simply noted the additional workload associated with a development process in which requirements frequently change after the delivery order is signed. Other schools noted frequent, often confusing, changes in procedures and templates by ATSC, without perceived justification or apparent benefit. Finally, a number of schools mentioned the considerable effort expended to submit an application for DL funding, with (at least in some cases) only a small probability of success. One school said they had recently submitted seven applications without receiving an award. Along similar lines, a couple of schools expressed frustration that TRADOC did not provide more guidance up front as to what it was willing to fund so that schools could more effectively decide where to apply their efforts.

Many schools also described the current process as too bureaucratic and inflexible to meet school needs, especially with regard to GFI requirements, the application of SCORM even when the likelihood of reuse is small, and the procedures for obtaining maintenance funding. A couple of schools also criticized the lack of a procedure to support faster courseware production when needed for urgent or high-priority projects. Schools reported that waivers from normal procedures are time-consuming and difficult to obtain because of "the large number of people in different places that have to agree."

[1] ATSC has undertaken a number of initiatives to shorten the time required for back-end testing. While a backlog was eliminated after one study, difficult new testing requirements led to its reemergence.

Finally, some schools felt that training content suffered from the lack of "someone in charge" of courses overall. In the development of several courses, a lack of continuity of the project team was noted, within both the school and the contractor. In another case, a school noted that multiple organizations had some responsibility for getting a course "up and running," but no one had responsibility for following through to ensure all the steps were cost-effectively completed and integrated.

Issues Concerning the Maintenance of IMI

Another challenge to DL program implementation concerns the difficulty of implementing timely changes to courseware after the development effort is completed. "Maintenance" of IMI software in this context implies minor-to-medium changes in a course, as opposed to a complete overhaul. The need for maintenance can come from several sources—it could be making minor changes to the entire course to keep it up to date, upgrading the course through a new delivery technology, or replacing or adding a relatively small section of new content to the course (perhaps due to a change in doctrine or requirements, or due to an assessment that the current lessons are not working well).

In the commercial IMI market, there is an underlying assumption that clients will want to update content fairly often and that such "maintenance" will be part of the planning to support the product once it is delivered. Such changes are handled either through a maintenance contract, which often specifies the hours of programmer time monthly that are included in the maintenance contract. If the client needs to go beyond that base number of hours in a month, then a separate small contract[2] is let. An alternative is to have maintenance "on call" as needed with an hourly rate paid to the developer.

The current TRADOC process for implementing postproduction maintenance of courseware often requires a new acquisition cycle and, as a result, could take several years from the identification of the need to the fielding of the updated content.

---

[2] Often a simple agreement written in regularly used contract language.

Nearly all schools (85 percent) cited maintenance as an obstacle, and 30 percent noted it as a key obstacle to providing high-quality courseware. In fact, schools that did not see maintenance as an issue either had no active courses or had found a way to update without going through the formal process of applying for funds. In explaining their concerns, schools noted that DL products need immediate and continual change to remain relevant, much in the same way that residential courses need updating on a continual basis. Requirements for change can be minimized through the careful choice of content for DL. However, less and less of the Army's training content remains stable. In addition, the training development staff noted that instructional departments were reluctant to "own" a course for which they could not control the content, i.e., keep up to date via maintenance. No instructor wants to be held responsible for courses that are inaccurate or out of date.

The need for change has led some schools to create an internal capability to make small maintenance changes in courseware themselves. However, schools have limited ability to make even minor changes because they lack the expertise to make the changes, or enough familiarity with contractors' file structure and authoring tools to properly perform the maintenance.

Moreover, the problem is compounded if a school has multiple courses that have been developed by different contractors, a likely outcome given the current contractor bidding process. When each piece of content is completed by a separate contractor, in-house staff typically have to gain expertise with multiple new file structures and authoring tools. This problem has led at least one school to standardize the authoring and content environment for all its courses (requiring contractors to use a specific file structure and set of authoring tools) so that it might train its staff to make changes in DL courses.

In practice, the schools noted that the disconnect between the need for change and the current processes for maintenance often leads schools to declare a course obsolete rather than submit a proposal for change. Thus, some DL courses ended up having artificially short lifecycles.

School-Contractor Interaction Issues

Another category of obstacles to DL program implementation concerns problems in the working relationship between schools and contractors. Schools cited this issue 60 percent of the time, and cited it as a key issue 30 percent of the time (the same as for the last two categories). Thus, while relatively fewer schools cited this category as an obstacle (other categories were mentioned 85 percent or more of the time), the issue was more likely to be a "key" one if mentioned at all.

In explaining this issue, some schools reported that there was high variability in the quality of the contractors.[3] According to some schools, some contractors simply did not understand the school's subject area well enough to produce quality content.[4] In addition, schools expressed frustration in not being able to prescreen contractors in order to avoid such a mismatch. In cases where the contractors would need to learn a great deal before being able to develop specific content, the schools felt there was an additional burden placed on them to educate the contractors. Schools also felt that there were no incentives in the program to reward improvement in performance over time—for example, to reward good performers with follow-on work. Similarly, some schools felt there was no way to impose consequences for poor performance. For example, schools felt that contractors experienced no consequences for lateness or poor-quality output.[5]

The focus group with contractors documented some of their frustrations with current processes. These included schools that expected significant mid-project changes in course design or content[6] but no change to the contract or increase in compensation. Contractors also

---

[3] At least from the point of view of being able to produce quality content in the particular school's occupational area.

[4] This was reportedly due to getting SMEs later in the development process, the quality of some SMEs, and a lack of regular collaboration between developer and school representatives.

[5] ATSC is currently working on a system to get more feedback from schools regarding contractor performance.

[6] This reportedly occurred frequently when points of contact at the school changed and the new point of contact had a perspective on content or instructional methods that differed from the predecessor's.

cited the high turnover of school personnel working on the project, as well as inadequate GFI and slow review of content. In a few cases contractors also reported a combative attitude by the school toward the contractor (e.g., seeming to assume the contractor was trying to maximize profit at the expense of the output). Moreover, contractors saw no consequences to the school for changing direction and, importantly, no way to effect changes in the contract when the need for additional work was identified. Contractors also noted the lack of any incentive for follow-on work for those who perform well. In their view, there was little to no effort made to build a solid working relationship with the client that could be amortized across multiple contracts.

Technology/IT/Standards Issues

Another category of challenges to DL program implementation concerns obstacles related to the technologies and IT standards (including those related to SCORM and the ALMS) that surround IMI. Schools cited this issue 85 percent of the time, but cited it as a key issue only about 25 percent of the time.

While most schools acknowledged ongoing improvements within the Saba system, they had a variety of comments on their experience to date. Some thought the Saba LMS was too narrow in the type of DL it would support, namely, the asynchronous IMI model now used by the Army for structured courses. Others thought that it had aimed at too broad an array of functions (e.g., career management, content management, administrative management, tracking of tasks trained to a detailed level) and hence increased the risk of failure, made integration difficult, and delayed the fielding of some of the more basic capabilities. Most schools thought the Saba product was not particularly "user-friendly," at least with regard to the functionality they were interested in at the local level. Respondents also associated the Army's product with long delays in courseware fielding, as the courses could remain in the ALMS testing queue for many months and, once tested, would not pass because the courses were not developed to the most recent ALMS standard. Schools also reported that some students had experienced difficulty getting credit for courses due to technical issues with the ALMS.

Other technology-related problems cited by schools included the complex authoring tool environment that makes it difficult to train staff to make simple changes and updates to finished IMI products. Schools also mentioned the lack of tools to support rapid development when that function is needed, as well as problems with playability of content on selected posts with CONUS. In particular, for security reasons, the Directorate of Information Management (DOIM) on selected posts would not allow all the software tools needed to allow content to run within their network.

Finally, schools (and TRADOC/ATSC headquarters staff as well) noted the high upfront investment required to build in the SCORM standards associated with courseware initially, and then to update the courseware as the SCORM standards changed over time. The goal of SCORM standards is to allow content sharing across LMS, and to support the possibility of reuse in future development efforts. However, schools found that the SCORM standards were not yet mature enough to ensure that training content that worked on one LMS would necessarily play correctly on another commercial LMS; they also pointed out that reuse was rarely needed. At the same time, the schools saw the standards as leading to long delays in courseware fielding and complicating the process of changing and updating courseware.

Issues Related to Buy-In from Key Stakeholders

The final category of obstacles concerns the level of commitment or "buy-in" among key Army stakeholders. This issue tended to involve senior leadership, school leadership, unit leadership, and the students themselves. Some stakeholder reluctance was due to their beliefs about DL, and some came from direct experience. Buy-in was least frequently noted as a key issue by the schools (5 percent) but was cited in some form by over half (55 percent) of the schools. While most of the schools acknowledged that stakeholder buy-in has improved since the early years of DL, they emphasized that many stakeholders were still reluctant to fully support DL.

At the schools, some stakeholders did not believe in the effectiveness of DL as a modality for training and, as a result, sought to resist its expansion. Specific issues mentioned ranged from a lack of

training transfer to the inability to prevent cheating on online tests. Schools reported that unit commanders expected their soldiers to complete their DL on their own time, thereby implying that it is a relatively unimportant component of training. The need to work in off-duty hours and concerns about quality and technical complexity have led some students to develop an unfavorable view toward DL, and many have chosen traditional training when that option has been available.

Within proponent schools, DL has been viewed more as a TRADOC Headquarters strategy for reducing school resources than as a method to transform training. In particular, some believe that resourcing methodologies for DL leave schools with inadequate resources to support the training. While at least some resourcing practices have been updated in recent years (and higher resourcing for DL is sometimes a possibility), some schools still believe that innovative efforts in the area of DL will lead to a resource penalty.

Much more could be ascertained concerning stakeholder buy-in through a survey of students, teaching departments and DL instructors. This is an area for further research.

Bibliography

ARI, *Training for Future Operations—Digital Leaders' Transformation Insights,* ARI Special Report No. 53, November 2002.

———, *Information Paper*, 2004. As of December 21, 2007: http://www.hqda.army.mil/ari/surveys/

———, *Distance Learning Findings, Fall 2006 Sample Survey of Military Personnel*, March 27, 2007.

Army Chief of Staff Memorandum, *Army Training and Leader Development Guidance*, August 2008.

ASTD Certification Institute, *E-Learning Courseware Certification (ECC) Standards (1.5),* Alexandria, Va.: American Society for Training and Development, 2001–2003.

BAE Systems, *Executive Summary Knowledge and Information Management in the Generating Force*, December 2007.

Bloom, B. S., et al., *Taxonomy of Educational Objectives* (two volumes: *The Affective Domain* and *The Cognitive Domain*), New York: David McKay, 1964. As of January 2011: http://www.nwlink.com/~donclark/hrd/bloom.html

Brandon Hall Research Staff, *How to Buy E-Learning Systems, Tools, and Services*, Sunnyvale, Calif.: Brandon Hall Research, Woodhill, 2006.

Chapman, B., "Optimizing Learning Strategies" Workshop Series, 2008. Two-day workshop for learning professionals. Workshop Materials available through Chapman Alliance LLC, Salt Lake City, Utah. As of January 2011: http://www.chapmanalliance.com

Chapman, B., et al., *Online Simulations: A Knowledgebase of 100+ Simulation Development Tools and Services,* Sunnyvale, Calif.: Brandon Hall Research, 2006a.

———, *Power Point to E-learning Development Tools: Comparative Analysis of 20 Leading Systems,* Sunnyvale, Calif.: Brandon Hall Research, 2006b.

Clark, R. E., "Guided Experiential Learning: Training Design and Evaluation," PowerPoint presentation, 2005. As of October 10, 2006: http://projects.ict.usc.edu/itw/gel/

Coombs, J., and M. Shanley, "Improving the Army's Acquisition Strategy for Acquiring Interactive Multimedia Instruction (IMI) Courseware," unpublished, 2008.

Deparatment of the Army, "All Army Activities" (ALARACT), May 6, 2007.

Department of Defense, *Strategic Plan for Transforming DOD Training*, February 2009.

———, *Training Transformation Implementation Plan*, February 2006.

Distributed Learning System, System Requirements Specifications: Increment 3, V2.1–8, Submitted by IBM, September 8, 2005.

Dumond, J., et al., *Velocity Management: The Business Paradigm That Has Transformed U.S. Army Logistics,* Santa Monica, Calif.: RAND Corporation, MR-1108-A, 2001. http://www.rand.org/pubs/monograph_reports/MR1108.html

Goldstein, I. L., "Training in Organizations," in M. D. Dunnette and L. M. Hough (eds.), *Handbook of Industrial and Organizational Psychology,* Vol. 2, 2nd ed., Palo Alto, Calif.: Consulting Psychologists Press, 1991.

Hallmark, B. W., and S. J. Gayton, *Improving Soldier and Unit Effectiveness with the Stryker Brigade Warfighters' Forum,* Santa Monica, Calif.: RAND Corporation, TR-919-A, forthcoming.

Hammer, M., and J. Champy, *Reengineering the Corporation: A Manifesto for Business Revolution*, New York: Harper Business, 1993.

Headquarters, Department of the Army (HQDA), *Materiel Requirements*, AR 71-9, April 1997.

———, *Army Acquisition Policy*, AR 70-1, December 2003.

———, *Army Knowledge Management and Information Technology*, AR 25-1, July 2005.

———, *Counterinsurgency*, FM 3-24, December 2006.

———, *Army Campaign Plan–Change 5*, April 2007.

———, *Enlisted Promotions and Reductions*, AR 600-8-19, July 2007.

———, *Army Training and Leader Development*, AR 350-1, August 2007.

———, *Operations*, FM 3-0, February 2008.

———, *Army Training and Leader Development Strategy*, draft, March 2008.

———, "TSPU MDEP: Training Support to Units," briefing, March 19, 2008.

———, Memorandum, SUBJECT: *Army Knowledge Management Principles,* July 2008.

———, *Training for Full Spectrum Operations* (Publications Draft), FM 7-0, December 2008.

Headquarters, Combined Arms Center, *OPORD 08-050A, Formation of CAC-Knowledge*, February 2008.

"IBM's Learning Transformation Story," June 2004. As of January 2011: http://www-304.ibm.com/jct03001c/services/learning/solutions/pdfs/learning_transformation.pdf

Kirkpatrick, D. L., "Techniques for Evaluating Training Programs," *Journal of the American Society of Training Directors,* Vols. 13–14, 1959–1960.

———, *Evaluating Training Programs: The Four Levels,* San Francisco, Calif.: Berrett-Koehler, 1994.

Mayer, R. E., "Strategies Based on the Modality Principle," in H. F. O'Neil, *What Works in Distance Learning*, Report to the Office of Naval Research, Center for the Study of Evaluation, University of California, Los Angeles, February 28, 2003.

———, and R. Moreno, "A Split-Attention Effect in Multimedia Learning: Evidence for Dual Processing Systems in Working Memory," *Journal of Educational Psychology*, Vol. 90, 1998, pp. 312–320.

Northern Regional Contracting Center, Army Contracting Agency, The Distributed Learning Education and Training Products Contract, contract W911S0-06-D-0001, delivery order W911S0-06-D-0003-0008, December 8, 2005, and associated contractual documents, Fort Eustis, Va.

O'Neil, H. F., *What Works in Distance Learning*, Report to the Office of Naval Research, Center for the Study of Evaluation, University of California, Los Angeles, February 28, 2003.

Office of Federal Procurement Policy, *The Federal Acquisition Regulation*, 48 CFR 1. As of February 28, 2008: http://acquisition.gov/far/

Piskurich, G., P. Beckschi, et al., *The ASTD Handbook of Training Design and Delivery*, New York: McGraw-Hill, 2000.

Rossett, A., *E-Learning Handbook*, American Society for Training and Development, New York: McGraw-Hill, 2002.

Schank, R. C., *Designing World Class E-Learning: How IBM, GE, Harvard Business School and Columbia University Are Succeeding at e-Learning*, New York: McGraw-Hill, 2002.

Schirmer, P. C., J. C. Crowley, N. Blacker, R. Brennan, H. A. Leonard, J. M. Polich, J. M. Sollinger, and D. M. Varda, *Leader Development in Army Units: Views from the Field*, Santa Monica, Calif.: RAND Corporation, MG-648-A, 2008. http://www.rand.org/pubs/monographs/MG648.html

Secretary of the Army/CSA Memorandum, "Subject: Army Knowledge Management (AKM) Guidance Memorandum Number 5—Army Training Enterprise Integration (ATEI)," September 7, 2004.

Senge, P. M., *The Fifth Discipline: The Art and Practice of the Learning Organization*, New York: Doubleday Business, 1994.

Shanley, M. G., J. C. Crowley, M. W. Lewis, R. Masi, S. G. Straus, K. J. Leuschner, S. Hartman, and S. Stockly, *Transformation and the Army School System*, Santa Monica, Calif.: RAND Corporation, MG-328-A, 2005. http://www.rand.org/pubs/monographs/MG328.html

Shanley, M. G., J. C. Crowley, M. W. Lewis, R. Masi, K. Leuschner, S. G. Straus, and J. P. Angers, *Supporting Training Strategies for Brigade Combat Teams Using Future Combat Systems (FCS) Technologies*, Santa Monica, Calif.: RAND Corporation, MG-538-A, 2007. http://www.rand.org/pubs/monographs/MG538.html

Straus, S. G., M. G. Shanley, R. M. Burns, A. Waite, and J. C. Crowley, *Improving the Army's Assessment of Interactive Multimedia Instruction Courseware*, Santa Monica, Calif.: RAND Corporation, MG-865-A, 2009. http://www.rand.org/pubs/monographs/MG865.html

StrykerNet Staff, "SBCT Warfighters' Forum (SWfF) Information Brief," presentation, May 2010.

TRADOC Inspector General Report, *Soldier Training Review,* December 2005.

U.S. Army Combined Arms Center, FMI 6-0-1, *Knowledge Management Cell,* October 2007.

U.S. Army Combined Arms Training Center, *AC-Knowledge*, February 2008.

———, *Organization and Functions*, TRADOC Regulation 10-5-4, February 2006.

U.S. Army Training and Doctrine Command (TRADOC), Organizations and Functions, TRADOC Regulation 10-5-1, Final Approved Draft Version, undated.

———, *The Systems Approach to Training Management, Processes, and Products*, Fort Monroe, Va.: TRADOC Regulation 350-70, March 9, 1999. As of January 2011: http://www.tradoc.army.mil/tpubs/regndx.htm

———, *TADLP Campaign Plan*, June 2001.

———, *Operational Requirements Document (ORD) for a Modernized Training System,* Fort Monroe, Va.: TRADOC, revised October 22, 2002.

———, *Multimedia Courseware Development Guide,* Fort Monroe, Va.: TRADOC Pamphlet 350-70-2, June 26, 2003. As of March 2011: http://www.tradoc.army.mil/tpubs/pams/p350-70-2.htm

———, *Distributed Learning—Managing Courseware Production and Implementation*, Fort Monroe, Va.: TRADOC Pamphlet 350-70-12, March 29, 2004. As of March 2011: http://www.tradoc.army.mil/tpubs/pams/p350-70-12.htm

———, *Army Comprehensive Guide to Modularity*, October 2004.

———, *TRADOC Campaign Plan with Change 1*, June 2006.

Wardell, C., "Levels of Interactivity," paper presented at 2006 dL Workshop, March 14, 2006.

Wexler, S., et al., *E-Learning 2.0.*, Santa Rosa, Calif.: The ELearning Guild, 2008.

Woodhill, G., *Emerging E-Learning Technologies: Tools for Developing Innovative Online Training,* Sunnyvale, Calif.: Brandon Hall Research, 2007.